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Sulfadiazine Pneumonia Therapy in the Canal Zone*

(With Especial Reference to Bradycardia)

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Those physicians in the Armed Services and in civilian practice who have had and who will continue to have the responsibility of treating large numbers of pneumonia patients can readily appreciate the many advantages of sulfonamide therapy, and more especially, in time of war. Having noted the excellent results obtained with certain sulfonamide preparations in pneumonia treatment in military[1,2,3] and in non-military practice,[4,5,6,7] we have now treated 100 consecutive unselected pneumonia patients in the Canal Zone, with sulfadiazine, with most gratifying results. These chemotherapeutic preparations were found to be equally effective in the treatment of pneumonia in tropical as well as in other climates. This present study was undertaken, utilizing the original dosage recommended by the Council on Pharmacy and Chemistry,[8] namely: 0.10 gm. per kilo. body weight initially followed by 1.0 gm. every 4 hours day and night until a normal temperature had been present for 72 hours, at which time the chemotherapy was discontinued. Following the completion of therapy in this group of 100 cases we have been using 4.0 gms. initially followed by the same dosage plan as given above, with equally effective results.

It should be stated that this group of 100 patients, most of whom were in the employ of "The Panama Canal," is not comparable in certain respects to the average group of patients in our armed forces or civilian practice because of the presence of large numbers of intestinal parasites and/or syphilis in many of the individuals covered by this report. The most noteworthy feature during diazine therapy in this series was the large number of patients who developed a sinus bradycardia, even as low as 36 beats per minute, as will be discussed later.

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Fifty-seven of these pneumonia patients were between 16 and 29 years of age, thirty-one between 30 and 49 years and twelve were above 50 years of age. All cases were studied clinically and by the usual laboratory procedures which included chest x-rays, sputum typing, daily blood counts and urinalyses, blood cultures and blood sulfadiazine determinations as well as electrocardiograms and other procedures as indicated. We may divide these 100 cases into 45 with a "lobar" and 55 with a "broncho" type of distribution. There were 42 typed pneumococcic (including 10 type I), 7 hemolytic streptococcic and 51 cases of undetermined etiology. Several of this last group of 51 cases were similar in certain respects to the so-called "atypical pneumonias" now being studied in certain military hospitals. The average total amount of sulfadiazine per patient was 40.5 gms. Maximum sulfadiazine blood concentrations varied from 8 mg. per cent to 30.8 mg. per cent with several above 20 mg. per cent. The temperature returned to normal by crisis within 48 hours in 78 patients, whereas it fell by lysis in 21, requiring from 48 hours to 10 days. Noteworthy also is the fact that the average elapsed time between the onset of symptoms and hospital admission was 4.07 days.

There was one death, resulting in a 1 per cent mortality rate. Several of these patients were seriously ill at the time of admission to the hospital. Disease and drug complications consisted of jaundice in one case, pleural effusion in two others, and only one instance of nausea and vomiting. Recovery from all complications was complete prior to discharge from the hospital. Throughout this study the importance of a fluid intake of 3000 to 3500 cc. daily and at least a 1500 cc. urine output each day was stressed. This is considered most important in reducing renal drug complications.

The most unusual feature in this study was the fact that 63 of these 100 patients developed a bradycardia under 60 beats per minute which was noted most often between the 3rd and 6th days after drug therapy had been instituted. Of the above 63 patients, there were 13 with a pulse rate between 50 and 40, and 7 that were under 40 beats per minute. Those cases studied electrocardiographically revealed the slow heart rate to be of sinus origin with no evidence of auriculo-ventricular heart block or other conduction abnormalities that were present during the period of bradycardia but not at other times. We are unable to explain this clinical manifestation in such a high percentage of cases, as there seemed to be no definite correlation between the heart rate and the blood sulfadiazine concentration or any other feature in this group. The patient whose blood diazine concentration reached 30.8 mg. per cent did not demonstrate a bradycardia at any time nor did any appreciable number of those with a concentration above 20 mg. per cent. In less than

one-fourth of the cases was the onset of the bradycardia coincident with the return of temperature to normal either by crisis or lysis. More often the onset began 2 to 4 days after the establishment of a normal temperature and the slow rate usually lasted 1 to 4 days. In several instances the heart rate dropped to about 60 initially, followed by a gradual decrease in rate to 45 or less over a 2 to 5 day period, then a return to a level above 60, usually between 70 and 80 beats per minute. In a few cases a rather slow bradycardia was noted at irregular periods, for instance on the 2nd, 5th and 6th days of hospitalization, with a rate above 60 on the 3rd and 4th days as well as after the 6th day. This latter feature added to the puzzling nature of this phenomenon.

SUMMARY

One hundred consecutive and unselected pneumonia patients in the Canal Zone were treated with sulfadiazine following the dosage originally recommended by the Council on Pharmacy and Chemistry[8] with the following observations:

1) There were 45 lobar and 55 broncho pneumonias.

2) The average length of time between onset of symptoms and hospital admission was 4.07 days.

3) Bacteriologically there were 42 typed pneumococcic (including 10 type I), 7 hemolytic streptococcic and 51 cases of undetermined etiology.

4) The average sulfadiazine dosage was 40.5 gms.

5) The maximum sulfadiazine concentrations varied from 8 mg. per cent to 30.8 mg. per cent.

6) The temperature returned to normal by crisis within 48 hours in 78 patients, by lysis in 21 (1 death).

7) Pneumonia and drug complications with complete recovery in all cases were as follows: Jaundice, 1; serous pleural exudate, 2; nausea and vomiting, 1.

8) There was one death, a mortality rate of 1 per cent.

9) Most noteworthy and inexplicable was the fact that 63 of the 100 patients developed a sinus bradycardia with occasional heart rates as slow as 36 beats per minute during or immediately following sulfadiazine treatment. These 63 included 13 with pulse rates between 50 and 40, and 7 cases under 40 beats per minute.

CONCLUSIONS

We believe that sulfadiazine is most efficacious in pneumonia therapy, that it is equally effective in the treatment of pneumonia in tropical as well as in other climates, and that it is accompanied by fewer drug reactions than sulfapyridine or sulfathiazole. We also believe that it is an outstanding addition to the armamentarium of

all physicians, more especially in time of war with the increased professional demands and responsibilities both on the home front and with our armed forces throughout the world.

RESUMEN

A cien enfermos con neumonía en la Zona del Canal, que ingresaron en el hospital consecutivamente y no fueron seleccionados, se les trató con la sulfadiazina de acuerdo con la dosis recomendada originalmente por la Junta de Farmacia y Química,[8] con las observaciones siguientes:

1) Hubo 45 neumonías lobulares y 55 bronconeumonías.

2) El intervalo entre la iniciación de los síntomas y el ingreso en el hospital promedió 4.07 días.

3) Desde el punto de vista bacteriológico hubo 42 neumonías neumocócicas clasificadas (que incluyen 10 de tipo I), 7 estreptocócicas hemolíticas y 51 casos de etiología indeterminada.

4) La dosis media de sulfadiazina fue 40.5 gramos.

5) Las concentraciones maximas de sulfadiazina variaron de 8 mg. por ciento a 30.8 mg. por ciento.

6) La temperatura bajó a lo normal por crisis dentro de 48 horas en 78 enfermos, por lisis en 21 (uno murió).

7) Complicaciones imputables a la neumonía y a la droga, con reposición completa en todos los casos, fueron como sigue: Ictericia, 1; derrame pleural seroso, 2; náusea y vómitos, 1.

8) Sobrevino una muerte, lo que da una mortalidad de uno por ciento.

9) Lo más digno de notarse y más inexplicable fue el hecho de que 63 de los 100 enfermos manifestaron bradicardia sinusal, observándose corazones tan lentos hasta de 36 latidos por minuto, durante o inmediatamente después de terminarse la serie terapéutica con la sulfadiazina. En estos 63 casos, hubo 13 con pulsos de 50 a 40, y 7 con menos de 40 pulsaciones por minuto.

CONCLUSIONES

Somos de la opinión de que la sulfadiazina es sumamente eficaz en la terapéutica de la neumonía, que es tan eficaz en el tratamiento de la neumonía en los trópicos como en otros climas, y que la acompañan menos reacciones imputables a la droga que en el caso de la sulfapiridina o del sufatiazol. Opinamos también que esta droga es una adición sobresaliente a la terapéutica a la disposición de todos los médicos, especialmente en tiempo de guerra que acarrea un aumento en las exigencias y responsabilidades profesionales tanto en el frente nacional como en compañía con las fuerzas armadas a través del mundo.

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The Inhalation of Nebulized Solutions of Sulfonamides in the Treatment of Bronchiectasis

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A number of patients with bronchiectasis have been treated by the inhalation of a nebulized solution of sodium sulfathiazole. In the first patient so treated oral administration of sulfonamides over a period of months had failed to control the acute infection or lessen the toxic symptoms. This, coupled with increasing intolerance to the sulfa drugs, led to the development of the method herein described. The dramatic result obtained in this patient was naturally followed by the use of this treatment in other bronchiectasis cases and stimulated a search of the literature for similar reports.

Biancani[1] in France has shown experimentally that inhalation of nebulized solutions results in the deposit of the drug throughout the tracheobronchial tree and within the alveoli themselves. He demonstrated a systemic absorption of insulin administered by this route. Castex et al[2] in Argentina report similar experimental results and have described the use of nebulized solutions of sulfonamides in various broncho-respiratory disorders with apparently good results. In this country the use of nebulized solutions of broncho-dilating drugs has become almost a routine in the treatment of asthmatic patients but reports of the administration of other drugs by this method are lacking in the literature. During the preparation of this manuscript a paper by Barach et al[3] was published in which they report the experimental use of nebulized promin in the treatment of tuberculosis in guinea pigs. They found that the animals so treated had "less tuberculosis in the lungs, less generalized tuberculosis and a far higher survival rate."

In order to stimulate interest in this form of therapeusis it therefore seems advisable to report the method of administration which I have found effective and the results of this treatment in a small group of bronchiectatic patients.

CHOICE OF THE DRUG USED

For systemic use in respiratory tract diseases sulfadiazine seems to be the drug of choice not only because of its comparative freedom from undesirable side effects but because it is the only sulfona-

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mide which is excreted in the sputum in concentrations practically equal to that present in the blood itself. This latter fact undoubtedly accounts for its high therapeutic efficiency in such cases. In order to determine which drug should be used in the nebulizer, laboratory tests were carried out by Dr. George Hartman. To solutions of the different sulfonamides were added cultures grown from the sputum of the patient to be treated. Plates were poured several hours later and counts of the colonies present the next day invariably showed a much lower colony count from the cultures exposed to the sulfathiazole solution. Osgood[4] in recent reports on the bacteriostatic effect of the sulfonamides found it to be most marked for sulfathiazole which therefore seems to be the drug of choice for local use.

METHOD OF ADMINISTRATION

One cubic centimeter of a 5 per cent solution of sodium sulfathiazole is placed in a nebulizer (Parke Davis adrenalin vaporizer or De Vilbiss No. 40) and this is connected by a rubber tube to an oxygen tank equipped with a flow meter. A rate of 5 or 6 liters of oxygen per minute will nebulize this amount of solution in 20 or 30 minutes. The patient holds the nebulizer between the teeth and breathes with the mouth open, it not being necessary to plug the nostrils. This method of depositing nebulized solutions within the tracheobronchial tree has been used for years in the treatment of asthmatic patients, with bronchodilator solutions.[5] Because of the caustic action of sodium sulfathiazole solutions the initial treatments were given slowly and cautiously but in no case did the treatment make the patient cough or show any other sign of irritation to the membranes. Sodium sulfathiazole in contact with body fluids precipitates out as sulfathiazole and presumably that is what happens as the finely dispersed particles are deposited upon these membranes. Treatments were given from one to three times a day over periods of many weeks, but evidence of local irritation or systemic effects of the drug were never seen. In the first case reported a test was made after administration of the drug for about three weeks, and this failed to show measurable amounts of the drug in the blood.

CASE REPORTS

Case 1—M. W. S. 39 yr. white female. Ten years ago developed tuberculosis right lung; disease inactive for the past four years. Right lung fibroid and permanently collapsed with bronchiectatic dilatations harboring a chronic infection which periodically becomes acute. During these exacerbations the temperature is elevated and patient quite toxic. From December, 1941, to March 1, 1942, these acute symptoms persisted in spite of sulfadiazine and sulfathiazole in 7-10 day "courses" with a few days interval between. By that time the leucocyte count was going down slowly

from 9,700 to 4,850 and the hemoglobin from 13 gms. to 12.5 gms. The patient's tolerance to these drugs was very low and she was nauseated, vomiting and suffering severe headaches. It seemed unwise to continue these drugs in view of the decrease in the white count and the systemic reactions. Since the infection was localized and its location known, it seemed logical to try to introduce the drug locally if possible and the method herein described was devised. The day following the beginning of treatment by inhalation, the patient's temperature was lower, the cough less, and within 48 hours the toxic symptoms had completely subsided.

Because of the great improvement in the patient's condition and the complete lack of any symptoms of irritation, the treatments were continued two or three times a day for many weeks. Laboratory tests showed a complete lack of the drug in the blood stream indicating that the action of the drug was entirely a local one.

Case 2—K. B. Male, aged 33. Tuberculosis of left lung for six years. Permanent phrenic paralysis, left side, in 1938. Sputum which had been negative again became positive in the summer of 1941 and a two stage, six rib thoracoplasty was started December 24, 1941, and completed on January 13, 1942. His general condition was most satisfactory following the second stage and the sputum was negative for acid fast organisms; however, he began to cough up large quantities of very purulent sputum. He was given daily nebulizations of 1 cc. of 5 per cent sulfathiazole after the organisms present in his sputum had been tested to see which was the most suitable sulfonamide to use in his case. After three weeks of this treatment the cough and expectoration had entirely disappeared and have not returned nearly six months later. His sputum has remained negative and general condition excellent.

Case 3—White female, age 33. Multiple cases of tuberculosis in immediate family, all of which were rapidly fatal. Patient developed tuberculosis in July, 1940, with cavity in left upper lobe. Pneumothorax was started on that side on September 24, 1940, and a collapse of about 60 per cent was secured but the diseased upper portion was held out near the chest wall by multiple adhesions. When referred on October 13, 1941, for pneumonolysis, x-rays showed a cavity about 3 cm. in diameter in the right lung at the hilar level. The adhesions on the left side were severed with little difficulty, and following that the left lung collapsed about 90 per cent. Although no air refills were given, the lung failed to become aerated again but merely shifted slowly to the left pulling with it the mediastinum. Bronchoscopic examination showed marked hypertrophy of the bronchial membrane on the left side and although this was treated repeatedly by bronchoscopic application of silver nitrate the lung has never reexpanded, probably due to a bronchial blocking beyond the range of bronchoscopic visualization. It was felt that something must be done for the cavity in the right lung, so, although the patient's vital capacity was only 1280 ccs., a temporary right phrenic crush was done on February 9, 1942. The vital capacity following this was reduced to 830 ccs. but although she was dyspnoeic on exertion, oxygen therapy was never considered necessary. A gradual adjustment of the cardiorespiratory physiology took place and the shortness of breath disappeared.

In April 1942, she developed a very distressing cough, mostly nonproductive, which interfered greatly with her sleep and caused her to vomit most of her meals. She was very miserable on account of this and was losing weight steadily. On April 15, she was started on nebulizations

of 10 minims of 5 per cent sodium sulfathiazole and 2 minims of metycaine solution 1 per cent. These were given t. i. d. and almost immediately produced a decided change in the cough and expectoration, so that by March 1 she would cough two or three times a day, just sufficient to raise the few cc's. of sputum which she was producing. The nebulizations were continued until July. The cavity in the right lung has disappeared as such although the sputum is still slightly positive. On August 4, 1942, the right phrenic nerve was recrushed without producing dyspnoea.

Cases 4 and 5—These are both cases of chronic bronchiectasis with profuse purulent sputum who were treated with daily nebulization of 1 cc. sodium sulfathiazole 5 per cent. In each case the amount of sputum was definitely lessened and changed from frankly purulent in character to a thin mucoid material in which were small purulent particles. The patients reported a feeling of increased well being.

CONCLUSIONS

1) Sulfathiazole may be applied locally to the tracheobronchial tree by inhalation of nebulized solutions of its sodium salt. Such treatments are entirely free from local irritation and the amount of the drug absorbed systemically is too small to be measurable.

2) Sulfadiazine is the drug of choice for systemic use in infections of the lung and bronchi, while for local use experiments indicate that sulfathiazole is best.

3) Nebulization of drugs in solution is an easy and therapeutically effective form of treatment. A convenient method for the nebulization of drugs in solution is described. While not original, this method has in the past been reserved almost entirely for the use of bronchodilator solutions in asthmatic patients.

SUMMARY

The use of nebulized Sodium Sulfathiazole solution in a small series of cases of bronchiectasis has resulted in distinct benefits. The first three cases reported were suffering from acute infections and in these the improvement was rapid and dramatic. No systemic reactions were noted and no untoward local effects resulted from the treatments.

CONCLUSIONES

1) Puede aplicarse el sulfatiazol localmente al árbol traqueobronquial mediante la inhalación de nébulas de su sal de sodio. Este tratamiento no causa irritación local alguna y la cantidad de la droga que el organismo absorbe es sumamente pequeña.

2) La sulfadiazina es la droga de elección para el uso interno en infecciones pulmonares y bronquiales, mientras que los experimentos indican que el sulfatiazol es mejor para el uso local.

3) La nebulización de drogas en solución es un tratamiento fácil y eficaz. Descríbese una técnica conveniente para la nebulización

de drogas en solución. Aunque esta técnica no es original, ha sido reservada en el pasado casi exclusivamente para el uso de soluciones broncodilatadoras en los asmáticos.

RESUMEN

El uso de nébulas de sulfatiazol sódico en una pequeña serie de casos de bronquiectasia ha resultado con claros beneficios. Los tres primeros casos presentados padecían de infecciones agudas y en éstos la mejoría fue rápida y espectacular. No se notaron reacciones orgánicas ni sobrevinieron efectos locales desfavorables imputables al tratamiento.

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Bronchoscopic Aids in Medical Conditions Within the Chest*

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Nearly half a century has elapsed since the removal of a foreign body from a bronchus under direct vision was successfully accomplished for the first time by Killian.[1] Despite that fact, bronchoscopy has thus far failed to obtain the universal recognition so clearly merited by its subsequent demonstration as an important adjument in the diagnosis and treatment of intrathoracic disease.

Apparently this situation is attributable mainly to two evident misapprehensions which prevail, not only among the laity, but in the minds of many of our fellow clinicians and internists as well. One of these is to the effect that the use of bronchoscopy is restricted solely to the removal of foreign bodies from the air-passages, or perhaps also to simple inspection of the latter, as the term signifies. The other concerns the alleged accidents and injuries which are declared to attend its employment.

Both impressions are quite incorrect. According to Bailey,[2] at the celebrated clinic directed by the dean of bronchoscopists, Chevalier Jackson, ninety-eight percent of all the procedures therein conducted are classified as diagnostic and therapeutic, while only two per cent involve the removal of foreign bodies. Earlier estimates of the relative proportion between the two sets of figures by Negus[3] and other writers reveal a slightly higher percentage of operations for the removal of foreign bodies. However, Clerf[4] believes that the gradual reduction in the percentage of operative procedures has resulted from the correspondingly increased number of patients referred to the bronchoscopist for causes other than the actual or suspected presence of foreign bodies. Moreover, in the hands of an experienced manipulator bronchoscopy is neither difficult nor dangerous. Usually it is performed under local anesthesia following premedication with morphine, cocaine, or atropine. Sedation is sometimes required to ensure adequate relaxation. Hospitalization is unnecessary for the majority of patients, since the procedure seldom entails collapse or shock, and never produces trauma, unless it is unduly protracted or improperly executed.

There are certain affections of the respiratory tract which seem particularly well adapted for nonsurgical diagnosis and treatment

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by the endobronchial method. They comprise chiefly atelectasis resulting from thick pulmonary secretions, bronchiectasis, bronchial stenosis, asthma, pulmonary abscess, malignancy of the lungs, persistent hemoptysis of obscure origin, and tuberculosis. Each of these conditions of the chest will be considered briefly in turn, primarily with relation to the indications for and the manner of application of the several variants of the method in question.

Atelectasis, or postoperative collapse of the lung, as distinguished from the lobar or multilobal atelectasis associated with hemoptysis which occurs in pulmonary tuberculosis, ensues shortly after operation, and is occasionally confused with so-called ether-pneumonia. While it is very frequently a consequence of upper abdominal operations where movements of the diaphragm are impeded either directly or reflexly, it is sometimes caused and is often aggravated by the formation of thick viscid mucus which acts as a plug. If it is not rapidly relieved by enforced inhalation and postural version, the atelectasis is gradually succeeded by suppuration in the guise of a drowned lung, then by purulent bronchitis, abscess, and possibly bronchiectasis, as shown by the Jacksons.[5] Aspiration of the plug by means of bronchoscopy is definitely indicated in this emergency, and when effected prior to the development of secondary pneumonic manifestations generally induces a spectacular recovery.

In bronchiectasis, or dilatation of the bronchi, associated with profuse and fetid expectoration, bronchoscopy is of diagnostic value principally as a means for the elimination of the possibility of the presence of a foreign body, particularly one of non-opaque character, or for the discovery of a stricture or a neoplasm as a cause of the condition. Bronchoscopic drainage and lavage serve only as palliatives in bronchiectasis. Nonetheless, the comfort afforded by periodic bronchial suction and irrigation, and the frequent improvement in the general health of patients which follows the employment of these procedures, amply attest their efficacy. Bronchoscopy is often combined with the medical and postural therapy of bronchiectasis (Scott-Brown[6]).

Constriction of the airway and the presence of pathologic secretions may occasion the symptoms of bronchial stenosis which in certain instances simulate those observed in bronchial asthma. The stenosis may be either intrinsic or else result from external compression. Direct inspection with the bronchoscope will reveal the existence or the absence of organic stenosis, and also facilitate the differential diagnosis between bronchial asthma and organic disease of the bronchi. The presence of thick secretion in the trachea or the larger bronchi may cause a rattling sound on respiration. This should not be confused with an asthmatic wheeze, but should be regarded as evidence of partial bronchial obstruction resulting

either from an endobronchial lesion or an extrabronchial process which has produced stenosis. Any wheeze, cough, or attack of dyspnoea otherwise unaccounted for is an indication for bronchoscopic exploration of the tracheobronchial tree.

Two forms of bronchial asthma are distinguished according to the bronchoscopic findings in each; namely, one type characterized by an active infectious tracheobronchitis, with highly inflamed mucosa, and an abundance of thick, viscid, tenacious secretion which occludes the lumen and adheres to the walls of the trachea and bronchi; and another which reveals a chronic passive congestion, with a cyanotic, leathery appearance of the mucosa, and a scanty secretion (Clothier[7]). Patients who suffer from the first of these two varieties of bronchial asthma are benefited markedly by the bronchoscopic aspiration of the secretion. Actually certain attacks may be aborted and severe paroxysms arrested by this expedient. The other methods proposed for the bronchoscopic treatment of asthma, notably that of endobronchial medication with astringent substances, can only relieve or terminate an isolated attack, unless the affection is secondary to the presence of a foreign body, neoplasm, or other condition amenable to specific treatment through the bronchoscope. Physical examination will of course render it possible to eliminate the cardiac, renal, and allergic forms of asthma in which bronchoscopy is inapplicable.

Diagnostic bronchoscopy should be performed in all instances of the occurrence of pulmonary abscess, provided it is not definitely contraindicated, and irrespective of the method of therapy which is afterward employed (Foster[8]). An acute abscess of the lung should practically always be treated by bronchoscopic aspiration. The pus which is present is usually thick and glutinous, and even though the cavity is not thoroughly explored and evacuated, the incidental dilatation of the bronchi and the removal of the viscid sputum generally effect marked and rapid improvement in the local and general condition of the patient. The bronchoscopic treatment of chronic pulmonary abscess includes aspiration, lavage, and dilatation of the bronchi or of strictures occasionally associated with the condition. Although irrigations with antiseptic solutions have been advocated by some authorities, simple alkaline or saline solutions have proved equally efficacious for the purpose. External drainage is not recommended in abscess of the lung which is secondary to a neoplasm of the bronchus or a previously undiscovered non-opaque foreign body.

It is the general consensus of opinion based upon a study of the literature, as well as upon clinical observations and autopsies, that cancer of the lung is on the increase. Furthermore, it has been repeatedly demonstrated that primary carcinoma more often affects

the bronchi, and that pulmonary tissue is only secondarily involved. The initial objective symptoms of malignancy of the lung, which manifest themselves at quite an early stage, consist of cough, frequent mild or severe hemoptysis, and sometimes slight elevations of temperature. Signs of bronchial obstruction accompanied by pain may develop later, and are generally associated with a certain degree of suppuration. While clinical signs of bronchial obstruction or infiltration of the lung may suffice for the presumptive diagnosis of malignant neoplasm, which may be confirmed by pathological examination of the sputum and radiological study, ordinarily the results of these latter procedures are conclusive only when they are conducted in the advanced stage of the disease. On the contrary, with the aid of bronchoscopy the earliest evidence of infiltrative ulceration or nodular formation may be readily discerned in the symmetrical and uniformly branching bronchus. Since bronchial carcinoma appears to exhibit a comparatively low grade of malignancy, the establishment of an early diagnosis is vitally essential for the success of any mode of treatment which may be selected. Therefore, every patient who presents cough, expectoration, or hemoptysis for which it is impossible to account by the usual physical examination should be urged to undergo bronchoscopy, particularly if dyspnoea is associated with the foregoing symptoms. Finally, biopsy of suspected tissue is rendered entirely practicable and simple by means of bronchoscopy. In many instances the histological examination of the specimen thus obtained immediately establishes or confirms the diagnosis of malignancy. If it be found that the neoplasm cannot be removed bronchoscopically, it may be treated with radium, radon in a container, or preferably by implantation of radon seeds, again with the assistance of the bronchoscope. Squamous celled pulmonary carcinoma often yields to palliative bronchoscopic therapy, because the symptoms which it produces are due to mechanical obstruction of the bronchi rather than to growth in the lung, hence the removal of the obstruction reestablishes ventilation and drainage of the parts of the lung which are situated beyond the growth. Bronchoscopic removal of tumors such as papillomata which reveal a tendency toward frequent recurrence should be followed by bronchoscopic aspiration for the prevention of possible relapses.

A careful bronchoscopic examination is imperative in all instances of hemoptysis of unknown origin. Here the hemoptysis is commonly tuberculous, but it may be due also to the presence of a neoplasm or result from granulations caused by localized suppuration in a large bronchus. The latter condition is quite susceptible of bronchoscopic treatment. However, if hemorrhage has been profuse, bronchoscopy should not be performed until the patient has recovered from the

loss of blood. Bronchial fibroma may prove to be the occult source of hemoptysis.

For tuberculosis the technique of bronchoscopy is in general similar to that already described in the course of our discussion of the diagnosis and treatment of other diseases of the chest. Clerf[9] asserts that diagnostic bronchoscopy is indicated in obscure pulmonary conditions which are suggestive of tuberculosis, wherein a diagnosis by the usual means is impossible; in demonstrated tuberculosis which exhibits signs and symptoms which necessitate additional investigation and treatment; and wherever definite endobronchial procedures constitute a desideratum. The contraindications enumerated by him include spontaneous pneumothorax, marked hemoptysis, extensive pulmonary alterations, and involvement of the larynx. He himself remarked no ill effects from bronchoscopy proper among a large group of tuberculous patients who were examined by that method. Pneumonography with bismuth subcarbonate or with a radiopaque substance in oil represents a valuable adjunct to bronchoscopy for the exploration of the tracheobronchial tree in certain instances. The instillation of an oily solution may be effected by bronchoscopy, and bronchoscopic pneumonography practiced on a fluoroscopic table, with the bronchoscope left in position while roentgenograms and fluoroscopic observations are completed, whereupon the iodized oil may be removed by aspiration through the bronchoscope. Cough and postural drainage should be induced immediately following the conclusion of the study. Patients should be cautioned not to swallow expectorations which may contain oil. The suspected presence of a bronchial foreign body affords an absolute indication for bronchoscopy, especially in the presence of obstructive emphysema or obstructive atelectasis, where the history of the aspiration of a foreign body is indefinite, and all the tests for tuberculosis are negative. The rupture of a tuberculous lymph-node into a bronchus has been known to result in bronchial obstruction with complete occlusion of the bronchus. Bronchoscopy may render conspicuous service as a means for the early diagnosis of tuberculosis of the tracheobronchial lymph-nodes, particularly among children, in whom it is often mistaken for foreign body in the trachea or in a bronchus, the possible presence of which may be either demonstrated or excluded by bronchoscopic examination. In the lobar or multilobar atelectasis which ensues occasionally as an acute development during hemoptysis, the blood-clot which forms the occlusive mass may be removed by bronchoscopy; or, more specifically, by aspiration with the aid of an independent tube introduced through the bronchoscope. Inspissated secretions are in their turn removed with forceps especially designed for the purpose and applied via the same route. Ordinarily bronchoscopy is contraindicated in the slow,

progressive form of atelectasis associated with fibrosis. Quite recently Clerf[9] has invited our attention to the potential influence of artificial pulmonary atelectasis on the treatment of tuberculosis. The rationale of the procedure which he proposes is based upon the well-known fact that the tubercle bacillus is definitely aerobic and that anaerobiosis inhibits its development and growth; also, that anoxemia of tissue present in areas of atelectasis promotes fibrosis. Thus, it is assumed that a cure would be facilitated by the induction of atelectasis with resultant anoxemia in a part of the lung affected with tuberculosis, through biological modification of the development of the tubercle bacillus and the production of fibrous tissue. Experiments are said to have shown that the requisite bronchial obstruction can be induced by the endobronchial application of silver nitrate solution. This procedure is deemed appropriate for employment in conjunction with thoracoplasty, provided a satisfactory collapse of cavities cannot be otherwise effected. However, the presence of anaerobic bacteria in the area which is involved affords a contraindication to the induction of bronchial obstruction by the endobronchial application of silver. Bronchoscopy may be safely employed to obtain secretion for examination in suspected abscess of the lung in tuberculous subjects. Where evidence of inadequate drainage with retention of pus exists, and a fluid level is demonstrable roentgenologically, the indications for bronchoscopy and postural drainage are identical with those for a pyogenic abscess with deficient drainage. Bronchoscopic aspiration is no more efficacious as a therapeutic agent in bronchiectasis associated with tuberculosis than it is in bronchiectasis in general. The detection of bronchiectasis in a pulmonary area which reveals clinical and radiological evidence of atelectasis and fibrosis may prove difficult. Frank hemoptysis alones does not warrant a presumptive diagnosis of tuberculosis in the absence of other symptoms. Although bronchoscopic examination is usually not indicated in hemoptysis of positive tuberculosis, obscure hemoptysis affords an absolute indication for bronchoscopy, because (as Clerf[9] has so pertinently remarked) this single symptom has more than all others together contributed to the erroneous diagnosis of tuberculosis. Finally, bronchoscopic exploration of the trachea and the larger bronchi in the dyspnoea of tuberculosis serves to rule out the possible presence of obstructive masses of granulation-tissue and cartilage or of suppurative peritracheobronchial lymph-nodes.

Our previous reference to the utility of pneumonography when employed in conjunction with fluoroscopy for the visualization of the tracheobronchial tract provides us with an opportunity for the cursory consideration of an art closely allied to bronchoscopy, namely, that of bronchography. The latter consists merely of the

introduction of iodized or bromized oils intended as contrast media into the tracheobronchial tree, usually by means of the bronchoscope, but occasionally also by intercricothyroid puncture and use of a cannula, tracheal catheterization, intubation, passive inspiration, or direct instillation into the trachea. However, the use of these oils is contraindicated in patients with cardiac disease which exhibits a tendency toward pulmonary passive congestion, likewise in those with active hemoptysis, angina pectoris, and aneurysm. Necessarily, also, the range of application of bronchography is limited to lesions not otherwise apparent radiographically, hence to those which affect the lumen of the bronchus by obstruction, stenosis, dilatation, position, course, and relationship. Accordingly, the principal indications for bronchography, as classified by Allen,[10] comprise (1) bronchiectasis, (2) the differentiation of lesions of the pleural cavity from those of the pulmonary parenchyma, (3) the study of the effect of therapeutic procedures, particularly of operations performed in multiple stages, and the evaluation of residual pathology, and (4) the localization of the trachea and the bronchi for the purpose of the differentiation of lesions of the mediastinum and pericardium. The accidental discovery of the fact that patients in whom bronchography was employed for the purpose of diagnosis experienced relief from their symptoms led eventually to the administration of the iodized oil for the therapy of chronic bronchitis and bronchiectasis. Though the precise mechanism of its action is still undetermined, Deuss[11] believes that the oil when thus instilled emulsifies and facilitates the expectoration of heavy, stagnant secretions, provokes mild irritation of the mucosa with the consequent promotion of a tendency toward the regeneration of epithelial cells, and by virtue of its content of iodine exerts a beneficial effect upon the general system.

The preceding illustrations of the manifold applications of bronchoscopy to medical conditions within the chest demonstrate beyond all controversy that this most recent phase of peroral endoscopy is, like its forerunners in the evolution of the latter specialty, esophagoscopy and laryngoscopy, logical in principle and sound in practice. In our peroration may we be permitted to express the earnest hope that elementary instruction in bronchoscopy will at the least be included eventually as a regular part of undergraduate medical education. Through this addition to the curriculum, on his graduation the young physician will be prepared to avail himself forthwith of the opportunity for the acquisition of the technical training and skill in the employment of bronchoscopy, obtainable either from a postgraduate course or during his internship in a hospital.

SUMMARY

Bronchoscopy has advanced far beyond the original indication for its use, the removal of foreign bodies from the bronchi, and is now recognized as a procedure that is, in experienced hands, neither difficult nor dangerous. In such conditions as atelectasis, bronchiectasis, bronchial stenosis, asthma, lung abscess, malignancy, unexplained hemoptysis and tuberculosis, bronchoscopy serves a definite purpose both in diagnosis and treatment. The specific functions of the bronchoscope in the management of these diseases are discussed. In the suppurative diseases its purpose of aspiration is stressed, keeping in mind that an obstructed bronchus might be the causative factor of the suppuration. In neoplastic disease its function is the early establishment of the diagnosis in order that the lung may be resected before metastases develop.

The indications for bronchoscopy in tuberculosis are the same as those in the diagnosis and treatment of other diseases of the chest: In establishing the diagnosis, in the bronchial obstruction produced by a ruptured tuberculous lymph gland, in the atelectases which occur with endobronchial tuberculosis, and in the exploration of the trachea and large bronchi in the dyspneic tuberculous patient to rule out the possible pressure of obstructing masses of granulation tissue.

In view of the many applications of bronchoscopy to medical conditions within the chest it is hoped that elementary instruction in bronchoscopy will at least be included eventually as a regular part of undergraduate medical education. Through this addition to the curriculum, the young physician will be prepared to avail himself forthwith of the opportunity for the acquisition of the technical training and skill in the employment of bronchoscopy, obtainable either from a post-graduate course or during the internship in a hospital.

RESUMEN

La broncoscopía ha avanzado mucho más allá de la indicación original para su uso, la extracción de cuerpos extraños de los bronquios, y está reconocida hoy como un procedimiento que, en manos experimentadas, no es ni difícil ni peligroso. En afecciones como la atelectasia, la bronquiectasia, la estenosis bronquial, el asma, el absceso pulmonar, la malignidad, la hemoptisis de origen desconocido y la tuberculosis, la broncoscopía tiene un propósito definido tanto en el diagnóstico como en el tratamiento. Discútese las funciones específicas del broncoscopio en la atención de estas enfermedades. En las afecciones supuradas se hace hincapié sobre su uso en la aspiración de las secreciones, acordándose también de que el

bronquio obstruido puede ser el factor casual de la supuración. En las neoplasias su función es el establecer el diagnóstico tempranamente para que pueda llevarse a cabo la resección del pulmón antes de que aparezcan metastasias.

Las indicaciones de la broncoscopía en la tuberculosis son las mismas que en el diagnóstico y en la terapéutica de otras enfermedades del pecho: En el establecer el diagnóstico, en la obstrucción bronquial causada por un ganglio linfático tuberculoso roto, en las atelectasias que se presentan en la tuberculosis endobronquial y en la exploración de la tráquea y de los bronquios mayores en el tuberculoso disneico para excluir la posible presencia de una obstrucción causada por mases de tejido de granulación.

En vista de las muchas aplicaciones que tiene la broncoscopía en afecciones médicas intratorácicas guárdase la esperanza de que por lo menos se incluirá con el tiempo enseñanza elemental en broncoscopía como parte regular en la educación médica antes de recibir el grado. Mediante esta adición al curso de estudios, el médico joven estará preparado para aprovecharse inmediatamente de la ocasión de adquirir el adiestramiento técnico y la habilidad en el uso del broncoscopio, asequibles a él ya en un curso de estudios de postgraduado, ya durante su internado en un hospital.

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DISCUSSION

COL. MILLARD ARBUCKLE, Station Hospital, Fort Leonard Wood, Missouri: I have been depressed and then elated by these last two papers. The second from the last speaker left me somewhat in the doldrums. I would have been more depressed by what he had to say about the prospects for treating cancer of the lung but for my own experience with such cases.

There are two or three ailments of the lung which the Doctor did not mention. I am sure it was not because he did not have experience with them but because he was pressed for time.

One of them is mycosis. They say these unusual things—I think that is one of them—come in threes. Some two or three years ago I had a case come in which was thought to be a lung abscess, but it was not of the usual type. As was my custom, I sent the secretions obtained by suction through the bronchoscope to the laboratory. And I should like to remark parenthetically that bronchoscopy is nothing but inspection, and one good look is worth a lot of guesses. The laboratory examination by direct examination and by culture revealed the presence of the ray fungus (actinomycosis).

In a short time, within a matter of probably two weeks, another man came along with a lung abscess, caused by the same organism.

Then in a short time a girl came in with a lung abscess caused by actinomycosis.

Tuberculosis occasionally occurs, especially in the upper lobe, without sputum. I have had such a case in which the pus was obtained by suction and it was loaded with a pure culture of tubercle bacilli, not enough sputum for a specimen in this instance.

Local treatment to local tuberculous lesions through the bronchoscope is very worthwhile: actual cautery is the one I prefer.

I was interested in what Dr. Peabody had to say about the treatment of lung abscesses. Two or three years ago I reported fifty-odd cases of simple lung abscess without gangrene, treated by the use of bronchoscopic drainage plus postural drainage.

You know, if you have a jug full of water and a stopper in it and you turn the jug over and loosen the stopper a little bit, it will leak out slowly. If you pull the stopper out, it will run out freely.

A lung abscess draining into a bronchus drains through granulation tissue. It amounts to a fistula. If you will take the granulations out of the fistula's tract by curettage and suction and let it bleed freely—and the more it bleeds the better, because the granuloma then shrinks—it will help the drainage when you make the patient use postural drainage. While you are doing it, inject the cavity. I have used lipiodol and I have also used guaiacol.

In these fifty cases about 53 per cent of them got well without

doing anything else. Some of them were chronic, some were acute. This report is in the literature. (See Proceedings, American O. R. T. Society.)

Occasionally we hear of or see an accident during anesthesia—aspiration of vomitus of the stomach contents. Not so long ago I was asked to see a woman who had been given an anesthetic. She was in the hospital, awaiting delivery. She had had her lunch which consisted of pea soup and some other things. Shortly after lunch she went into labor. By the time they got the forceps on she vomited and it was right difficult to manage the vomiting and the delivery successfully and so she aspirated both lungs full of vomitus. I saw her the next morning. She was unconscious. She had a solid bilateral pneumonia, of both lower lobes, with the sort of temperature, pulse and respiration that you would expect. She was so nearly moribund that, laid across the bed, she was bronchoscoped without any anesthesia of any kind. She was then turned over on her abdomen, for postural drainage, and she was filled up with sulfanilamide and by the next day she was well on her way to recovery.

I merely cite this case as an illustration of the value of bronchoscopic aids in the treatment of sick people with lung troubles.

I was glad to hear Dr. Peabody mention the too-evident misapprehension of the internist, regarding the danger of bronchoscopy. It is really heartening. It is worth the trip here, even if I did have to stay up all night, to hear one internist say that, because I have been plagued for years with pediatricians and internists who are afraid to have their patients examined for fear that something might happen to them.

A biopsy specimen may be obtained in nearly all tumors of the lung. Tumors in the middle lobe can be successfully biopsied. I have done this by dilating the middle lobe bronchus first forcibly and so as to be able to insert the bronchoscope big enough to carry a biopsy forceps. I have also introduced pneumothorax in tumors that are high up in the chest, and without adhesions and then tilted the table and watched air bubbles rise and push the lung down so as to line up the lumen of the bronchoscope and the upper lobe bronchus.

"Bronchoscopy is of value in localizing tumors for the benefit of the surgeon, as well as is bronchography. The surgeon must know whether it is possible for him to get between the tumor and the carina before he starts, and only by looking at it, can we get first a biopsy and, secondly, can we tell how near to the carina it is."

DR. PAUL H. HOLINGER, Chicago, Illinois: I had the privilege of reading this paper a day or two ago and it was a great satisfaction to hear of bronchoscopy in this illuminating manner from an in-

ternist. Certainly from Dr. Peabody's paper we realize that he has gone further than *bronchoscopy* and has stressed a term which we have used in our Association, namely, *bronchology* rather than *bronchoscopy*.

This paper is a fitting conclusion to the program of the American College of Chest Physicians and also a fitting introduction to the program of the American Broncho-Esophagological Association; it has been placed in a fortunate position. But further than that it is a milestone in medicine. In the past the otolaryngologist, who has been the bronchoscopist, has looked into the lung and has constantly tried to convince the internist through the medium of the American Broncho-Esophagological Association of the importance of this field. The pioneer work done by the otolaryngologist is now carried on by the members of the American College of Chest Physicians and others interested in the specialty. Now, in regard to bronchoscopic problems, those who in the past had to be convinced of the necessity of bronchoscopic procedures are placing increasing diagnostic and therapeutic importance on them.

It has been very interesting to hear Dr. Peabody's excellent discussion in this key position on the program.

Correlated Applied Anatomy of the Bronchial Tree and Lungs With a System of Nomenclature*

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The anatomy of the tracheobronchial tree seems, from the illustrations given in the average anatomical textbook, to be a very complicated thing. Even in the early days of bronchoscopy, however, the bronchoscopists developed a certain familiarity with two primary or main bronchi and their secondary or lobar branches. They found that they must study lateral as well as anteroposterior films of the patient's chest in order to comprehend the problem of approach to the lesion or foreign body in question. The lateral film proved particularly helpful in determining which lobe was affected, and hence through which lobar bronchus the endoscopic approach could be made.

The principal landmarks of the tracheobronchial tree were early described, beginning with the "vertical" carina marking the bifurcation of the trachea into right and left primary or main bronchi, and the spurs and orifices of the right upper and middle, and the left upper, secondary or lobar branches. Ordinary bronchoscopic inspection did not permit the visualization, except in certain atypical or abnormal cases, of the branches of the upper lobe bronchi, nor of the middle lobe bronchus, but in both the lower lobe bronchi a number of the branch bronchial orifices could be seen. Even though these orifices of the lower lobe branches could be seen, little attention was paid to their differentiation or nomenclature.

James Hardie Neil,[1] the distinguished New Zealand bronchoscopist and bronchologist, has written several articles in which he has described these "tertiary" bronchi, calling attention to their relation to corresponding subdivisions of the lobes of the lungs, or "bronchopulmonary segments." Kramer and Glass[2] had already spoken of these (1932). The much earlier anatomical studies of Aeby[3] (1880) and Ewart[4] (1889) are also of interest and importance. Nelson[5] discussed the clinical applications of anatomical considerations to postural drainage in the British Medical Journal in 1934.

We believe that the bronchologist should be able to tell, when he

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looks at an x-ray film, in what segment the foreign body or lesion is, and just where he should find the orifice of the bronchus leading to it; when he looks at a bronchial orifice, he should know just how large a portion of lung that bronchus supplies, what pleural surface it has, and what its other relations are.

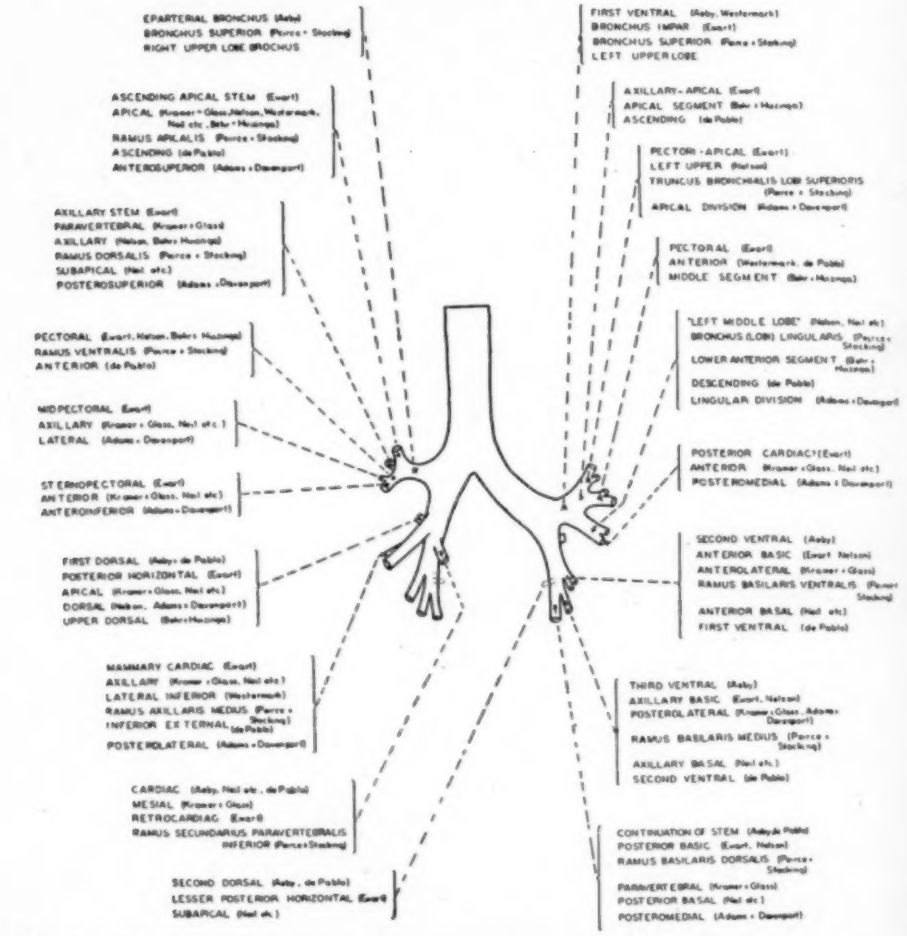
EPARTERIAL BRONCHUS (Aeby)
BRONCHUS SUPERIOR (Pierce • Stocking)
RIGHT UPPER LOBE BRONCHUS
ASCENDING APICAL STEM (Ewart)
APICAL (Kramer • Glass, Nelson, Westermark, Neil etc., Behr • Huizinga)
RAMUS APICALIS (Pierce • Stocking)
ASCENDING (de Pablo)
ANTEROSUPERIOR (Adams • Davenport)
AXILLARY STEM (Ewart)
PARAVERTEBRAL (Kramer • Glass)
AXILLARY (Nelson, Behr • Huizinga)
RAMUS DORSALIS (Pierce • Stocking)
SUBAPICAL (Neil etc.)
POSTEROSUPERIOR (Adams • Davenport)
PECTORAL (Ewart, Nelson, Behr • Huizinga)
RAMUS VENTRALIS (Pierce • Stocking)
ANTERIOR (de Pablo)
MIDPECTORAL (Ewart)
AXILLARY (Kramer • Glass, Neil etc.)
LATERAL (Adams • Davenport)
STERNOPECTORAL (Ewart)
ANTERIOR (Kramer • Glass, Neil etc.)
ANTEROINFERIOR (Adams • Davenport)
FIRST DORSAL (Aeby • de Pablo)
POSTERIOR HORIZONTAL (Ewart)
APICAL (Kramer • Glass, Neil etc.)
DORSAL (Nelson, Adams • Davenport)
UPPER DORSAL (Behr • Huizinga)
MAMMARY CARDIAC (Ewart)
AXILLARY (Kramer • Glass, Neil etc.)
LATERAL INFERIOR (Westermark)
RAMUS AXILLARIS MEDIUS (Pierce • Stocking)
INFERIOR EXTERNAL (de Pablo)
POSTEROLATERAL (Adams • Davenport)
CARDIAC (Aeby, Neil etc., de Pablo)
MESIAL (Kramer • Glass)
RETROCARDIAC (Ewart)
RAMUS SECUNDARIUS PARAVERTEBRALIS INFERIOR (Pierce • Stocking)
SECOND DORSAL (Aeby, de Pablo)
LESSER POSTERIOR HORIZONTAL (Ewart)
SUBAPICAL (Neil etc.)
FIRST VENTRAL (Aeby, Westermark)
BRONCHUS IMPAR (Ewart)
BRONCHUS SUPERIOR (Pierce • Stocking)
LEFT UPPER LOBE
AXILLARY-APICAL (Ewart)
APICAL SEGMENT (Behr • Huizinga)
ASCENDING (de Pablo)
PECTORO-APICAL (Ewart)
LEFT UPPER (Nelson)
TRUNCUS BRONCHIALIS LOB SUPERIORIS (Pierce • Stocking)
APICAL DIVISION (Adams • Davenport)
PECTORAL (Ewart)
ANTERIOR (Westermark, de Pablo)
MIDDLE SEGMENT (Behr • Huizinga)
"LEFT MIDDLE LOBE" (Nelson, Neil etc.)
BRONCHUS (LOBI) LINGULARIS (Pierce • Stocking)
LOWER ANTERIOR SEGMENT (Behr • Huizinga)
DESCENDING (de Pablo)
LINGULAR DIVISION (Adams • Davenport)
POSTERIOR CARDIAC (Ewart)
ANTERIOR (Kramer • Glass, Neil etc.)
POSTEROMEDIAL (Adams • Davenport)
SECOND VENTRAL (Aeby)
ANTERIOR BASIC (Ewart, Nelson)
ANTEROLATERAL (Kramer • Glass)
RAMUS BASILARIS VENTRALIS (Pierce • Stocking)
ANTERIOR BASAL (Neil etc.)
FIRST VENTRAL (de Pablo)
THIRD VENTRAL (Aeby)
AXILLARY BASIC (Ewart, Nelson)
POSTEROLATERAL (Kramer • Glass, Adams • Davenport)
RAMUS BASILARIS MEDIUS (Pierce • Stocking)
AXILLARY BASAL (Neil etc.)
SECOND VENTRAL (de Pablo)
CONTINUATION OF STEM (Aeby, de Pablo)
POSTERIOR BASIC (Ewart, Nelson)
RAMUS BASILARIS DORSALIS (Pierce • Stocking)
PARAVERTEBRAL (Kramer • Glass)
POSTERIOR BASAL (Neil etc.)
POSTEROMEDIAL (Adams • Davenport)

Fig. 1—Synthetic tabulation of bronchial terminologies suggested by various writers from Aeby[3] (1880) and Ewart[4] (1889) to Hardie Neil[1] (1939) and Adams and Davenport[6] (1942). Note that most of these systems are not consistent with respect to the basis on which the terms are selected.

As we have already stated, the bronchoscopist can ordinarily visualize the orifices of the segmental branches of the lower lobe bronchi only, but if more attention is paid to the study of the segmental bronchi, it is probable that ways will be found for catheterizing these branches of not only the lower, but also the middle, and even the upper lobe bronchi. In this connection, the increased use of both straight and retrograde telescopes will be of much help. In any event, we feel that the time has come when every *bronchoscopist,* certainly every *bronchologist,* must think in terms, not of lobar

bronchi and lobes alone, but also of segmental bronchi and bronchopulmonary segments, if his observations are to be accurate, and especially if his reports are to be of maximum value to the thoracic surgeon.

The various writers mentioned have all used different terminologies (Fig. 1) in referring to the various branches of the bronchial tree and their corresponding lung subdivisions, but almost all recognize the fact that the lobes are subdivided into smaller units, and most use the term *bronchopulmonary segments* to describe these. In its simplest conception, the bronchopulmonary segment may be defined as the area of distribution of any bronchus. It is a mistake to have too rigid a conception of the bronchopulmonary segment because the lung is really divided into smaller and smaller segments, each respectively the *area of distribution of a certain bronchus*. The largest segments into which each lobe divides according to bronchial distribution are, we believe, of the greatest clinical importance. However, it must be recognized that they are not the smallest units, and that these segments are composed of smaller segments, because each smaller branch bronchus has its corresponding segment. Furthermore, we must recognize the fact that in some instances two of the branches that generally constitute separate major segmental bronchi may have a common trunk and hence distribute to a single major segment. This is a reason for the variation in descriptions of, for example, the right upper lobe, which is described by some as having four segments, and by others as having only three.

Of the various methods of studying and demonstrating the relationship of the segmental bronchi and their corresponding bronchopulmonary segments, one of the best is the inflation method described by Hardie Neil. The more tedious dye injection methods have been used by others, and of course dissection is an indispensable method if we are really to know the structures and their variations. Our studies have made use of all of these methods.

These studies of the bronchial tree and lungs have convinced us of the fact that, whatever terminology is used, the lungs should be thought of as subdivided according to bronchial distribution, rather than by fissures. The fissures are much less constant both as to the absence of the ones usually present, and as to the presence of anomalous ones.

Now as to nomenclature: There is great need for the general acceptance of a standard clinical terminology which will be acceptable to the bronchologist, the thoracic surgeon, and the radiologist, and which will meet with the approval of the anatomist. We believe that none of the systems suggested up to this time fulfill the requirements as we see them, and in an effort to make a contribution to the ultimate solution of the problem we have a system to

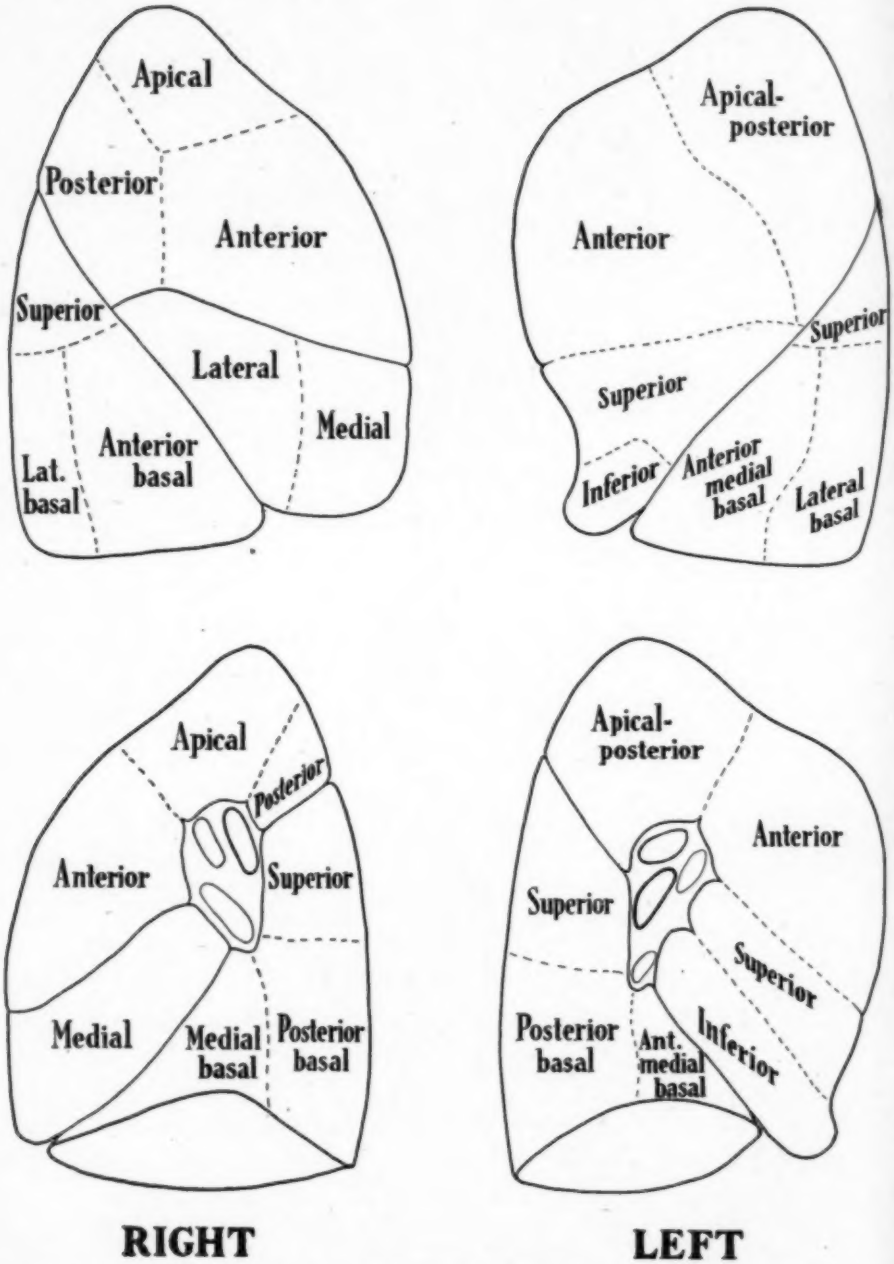

Fig. 2—The bronchopulmonary segments, shown in both lateral (above) and mediastinal (below) aspects. The terminology used in this illustration is the one we are suggesting (see also Plate I).

offer which is based largely on that suggested by Hardie Neil. We wish to acknowledge indebtedness also to Adams and Davenport,[6] Kramer and Glass, and others whose works will be found listed among the references.

The following nomenclature is submitted for consideration and trial by the members of the College and others dealing with diseases of the chest:

RIGHT LUNG		LEFT LUNG		
LOBES	SEGMENTS	LOBES		SEGMENTS
Upper	Apical Posterior Anterior	*Upper*	Upper Division	Apical-posterior Anterior
Middle	Lateral Medial		Lower (Lingular) Division	Superior Inferior
Lower	Superior Medial Basal Anterior Basal Lateral Basal Posterior Basal	*Lower*		Superior Anterior-medial Basal Lateral Basal Posterior Basal

Whenever feasible, we have made use of names which have had some general acceptance, in that they have been used in several of the suggested nomenclatures. We have taken as a common basis for the choice of all names the position of the segment in the lobe. This has been indicated as accurately as possible without making an unwieldy name (Fig. 2). The corresponding segmental bronchi are designated by the names of the segments which they supply.

The terms *apical* and *basal* are firmly established in the literature of diseases of the chest, and are thus easily remembered. The term subapical used by Hardie Neil for what we call the posterior segment of the right upper lobe has the fault that this segment is really no more subapical than the anterior segment. We have used the term *lateral* instead of axillary throughout because the term axillary is properly applied only to the region of the armpit. The segments of the middle lobe we have called *medial* and *lateral* because these terms seem to describe most simply and accurately their relations. We have discarded the term apical as applied to the *superior* segment of the lower lobes, because we prefer to reserve it for the segment which occupies the apex of the lung. Hardie Neil has empha-

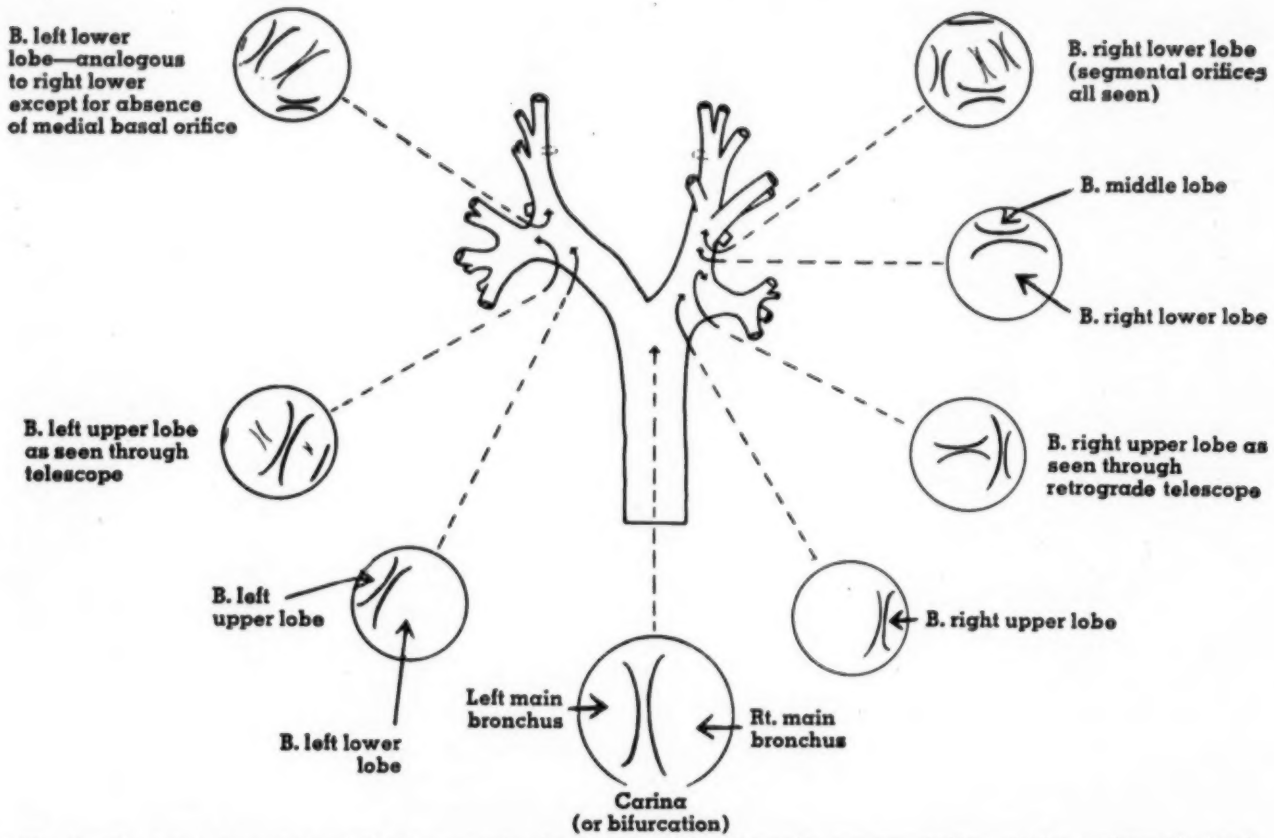
B. left lower lobe—analogous to right lower except for absence of medial basal orifice
B. right lower lobe (segmental orifices all seen)
B. middle lobe
B. right lower lobe
B. left upper lobe as seen through telescope
B. right upper lobe as seen through retrograde telescope
B. left upper lobe
B. right upper lobe
Left main bronchus
Rt. main bronchus
B. left lower lobe
Carina (or bifurcation)

Fig. 3—The lobar bronchi and their segmental branches, with schematic representation of the endoscopic landmarks. In this diagram the bronchial tree is shown "upside down," because it is desired to represent the structures in the same relation as that which they bear to the bronchoscopist's eye when the patient is examined in the usual position of dorsal recumbency (see also Plate I).

sized the importance of what he calls the subapical branches of the lower lobe bronchi; these, when present, could be called subsuperior or suprabasal branches. One of our more important suggested changes in the Hardie Neil terminology is that the cardiac bronchus and segment be called *medial basal*. This seems appropriate in that it calls attention not only to the medial location of this segment, but also to the fact that it is a basal segment. The *anterior, lateral* and *posterior basal* segments are as named by Hardie Neil except for the substitution of lateral for axillary. On the left side, we recognize the upper and lower subdivisions of the upper lobe, as described by Adams and Davenport[6] and we consider "lingular" a good alternative name for the lower. The upper subdivision consists of two principal segments which we have called *apical* or *apical-posterior,* and *anterior*. The segments of the lingular division have been called antero-lateral and postero-medial by Adams and Davenport, but since their fundamental relationship is one above the other, we think *superior* and *inferior* would be preferable terms. In the left lower lobe the segments are analogous to those of the right, except that the medial basal is a branch of the anterior basal and not a separate branch of the lower lobe bronchus. We suggest that the name *anterior-medial basal* be used if it is desired to call attention to this fact, or that the simple term anterior basal be used, bearing in mind that it corresponds to the anterior basal on the right, plus the medial basal. Finally it should be stated that, in human anatomy, anterior and ventral are synonymous and interchangeable terms; likewise posterior and dorsal; superior, cranial, and cephalic; inferior and caudal.

The clinical applications of the foregoing are innumerable, and it will be possible only to mention briefly one or two general considerations in this paper. First of all, there are two general ways in which the correlated bronchopulmonary anatomy is important. In the first place, when we look at an x-ray film we should be able to tell not only in which lobe, but also in which segment a lesion or a foreign body is located, and hence how to proceed to locate the particular branch bronchus leading to it. Secondly, when we look down a bronchoscope and see a certain bronchial orifice (Fig. 3) we should have clearly in mind the location, relations and relative size of its corresponding bronchopulmonary segment (Plate I). Only by such knowledge can we make the most use of our roentgen studies, and only thus can we properly interpret our endoscopic findings and make reports which will be of maximum significance. Clinical applications will be discussed more specifically in a subsequent paper. Churchill and Belsey[7] have recently discussed some of these from the surgical viewpoint.

SUMMARY

The anatomy of the bronchial tree is discussed with reference to the branching into lobar and segmental bronchi, and the relation of each lobar and segmental bronchus to its corresponding portion of lung. The terminologies used by various writers are discussed, particularly that of James Hardie Neil, and a new nomenclature is proposed.

RESUMEN

Discútese la anatomía del árbol bronquial con referencia a la ramificación en bronquios lobulares y segmentarios, y a la relación que guarda cada bronquio lobular y segmentario al segmento correspondiente del pulmón. Discútese las terminologías usadas por varios autores, en particular la de James Hardie Neil, y propónese una nueva nomenclatura.

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*This paper came to our attention too late for mention in the text of our paper.—*Authors.*

Post-Thoracoplasty Care*

Scoliosis, Pain and Rehabilitation

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The modern extrapleural thoracoplasty has become a most effective collapse measure for the closure of tuberculous cavities. Most reports of the results of thoracoplasty deal with its main object, i.e., cavity closure and sputum conversion. There are, unfortunately, certain sequelae of thoracoplasty that must be evaluated in a full appraisal of the end results of this procedure. A patient may have a very effective collapse of the diseased lung and have a negative sputum and yet be left an invalid because of mechanical derangement of the chest and shoulder. Much progress has been made in the past decade in both increasing the selectivity of the collapse from thoracoplasty and at the same time minimizing the disagreeable mechanical changes that result from the resection of ribs.

The chief mechanical effects of thoracoplasty that may contribute to invalidism or disability are: (1) pain in the chest or shoulder; (2) scoliosis; (3) limitation of motion of the shoulder. Deformity of the chest may not cause organic symptoms but if it is present to a marked degree, it may be a source of embarrassment to an extent to cause it to be classed as an actual disability. Proper technique in the fashioning of a thoracoplasty will minimize to a great degree the resultant deformity and disability. Attention to details in post operative care will prevent pain and limitation of motion in the involved shoulder.

Residual pain following thoracoplasty may be (1) constant or (2) present only upon motion of the shoulder. Constant pain often is a sensation of tightness or restriction due to the contraction of the underlying fibrotic lung or thickened pleura. This discomfort almost always disappears in a few months. Intercostal neuritis caused by pinching of the nerves by the rib stumps may be the source of a constant pain. Removal of long lengths of ribs will prevent this disagreeable sequelae to thoracoplasty. Where the nerves have been caught by scar tissue or bony callous, injection of the nerve with procaine or alcohol will usually relieve this pain. This type of pain also disappears with time. Pain present only upon motion of the shoulder is usually due to contact of the scapula with some bony prominence. Riding of the angle of the scapula over the next un-

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resected rib is a frequent cause of discomfort in patients in which more than five and less than nine ribs have been resected. As a rule, an eight rib thoracoplasty leaves a comfortable shoulder but in a patient with a long scapula, the tip of the scapula may reach the ninth rib. This condition may be relieved by the resection of one or more lower ribs or by removing the angle of the scapula. The author prefers partial scapulectomy over rib resection to correct this situation in all cases where the degree of collapse is satisfactory because vital capacity is thus preserved. Resection of as much as one third of the lower portion of the scapula seems to affect very little the range of motion and strength of the shoulder. In patients in whom a six or seven rib thoracoplasty is considered sufficient to bring about cavity closure the partial scapulectomy may be done as part of the final stage without adding to the risk of the procedure. Rarely the veterbral border of the scapula following an extensive thoracoplasty will slide across the spinous processes of the veterbrae causing sharp discomfort. This condition can be relieved by resection of a portion of the scapula along the veterbral border.

Scoliosis in some degree follows almost every thoracoplasty. In the majority of patients the scoliosis will not be noticeable and presents no problem. In certain cases it may be severe enough to be the chief complaint of the patient. Every effort should be made to prevent the occurrence of scoliosis without, at the same time, limiting the effectiveness of the collapse. The amount of residual scoliosis is influenced by: (1) the age of the patient; (2) the extensiveness of the thoracoplasty; (3) the degree of fibrosis of the underlying pleura; and (4) the manner in which the operative procedure is carried out.

Children and adolescents will develop severe scoliosis following the usual extrapleural thoracoplasty. Careful attention to details in operative technique that will be discussed later should be carried out to reduce the degree of scoliosis. In the post operative period and the months of convalescence that follow, body casts or spine braces that hold the patient in an over corrected position are of definite aid. The consultation of an orthopedic surgeon in this problem is most desirable and should be obtained when possible.

Obviously a very extensive thoracoplasty is likely to produce a greater degree of scoliosis. Structures such as ribs, intercostal muscles, sacrospinalis muscle, and the transverse processes have been removed or deranged, thus weakening the whole supportive mechanism of the involved side of the chest. A very thick pleural scar due to empyema or a high degree of underlying pulmonary fibrosis may add support to an extent to prevent scoliosis. It is not uncommon to have no spinal curvature following a very extensive thoracoplasty

over an empyema. In fact, scoliosis previously present due to the empyema may be corrected by the thoracoplasty.

Attempts to prevent scoliosis from developing following thoracoplasty by postural exercises, such as lying over a rolled pillow, and by braces have been discouraging. The major attempt to prevent scoliosis must be made at the time of the operation. The intercostal muscles and sacrospinalis muscle should be preserved as much as possible while carrying out the rib resection. The transverse processes should be resected from the third dorsal vertebra to the process at the lower level of the lesion to be collapsed. There is no valid reason for resecting the transverse processes of the first and second dorsal veterbae as they will be above the region to be collapsed. Likewise the tapering off of the lower transverse processes.

Four muscles that connect the cervical vertebrae with the upper ribs have their lower attachments released at the time the first stage of the thoracoplasty is performed. These are the three scaleni and the serratus posterior superior muscle. When they are released their antagonists on the opposite side of the neck are unopposed and thus draw the head and neck to the opposite side giving the characteristic wry neck present following thoracoplasty. It seems logical that this muscular imbalance accounts for most of the resultant lower cervical and upper thoracic scoliosis. During the past two years the author has reattached the posterior scalene and serratus posterior superior muscles to the sacrospinalis muscle at the time of the first stage in an attempt to partially correct this imbalance. It has not been found technically feasible to reattach the anterior and middle scaleni muscles since no supporting structure was readily available for an anchorage. It is too early to report accurate clinical results but this procedure has promise in helping to reduce scoliosis following extrapleural thoracoplasty. It may be found that scalenotomy on the opposite side following completion of the thoracoplasty will correct severe scoliosis. To my knowledge this has not been done but it is certainly a logical procedure and deserves a trial.

Discomfort connected with a poor fitting scapula following thoracoplasty may cause the patient to assume a posture that accentuates the existing scoliosis. Partial scapulectomy or further rib resection might correct this postural defect and quickly correct an apparent but not real deformity. The shoulder on the operated side is usually slightly higher than the opposite shoulder but if it is held too high, either the scapula is held up by an unresected rib or the trapezius muscle has been unnecessarily damaged by the operative approach. Carrying the incision high through the trapezius muscle gives must better exposure of the first rib and facilitates its resection. It is preferable, however, to have the surgeon work harder for

a few minutes in order to afford the patient a better cosmetic result.

Limitation of motion of the shoulder girdle and arm following extrapleural thoracoplasty is due to: (1) pain due to an ill-fitting scapula; (2) subscapular adhesions; (3) intra-articular adhesions; and/or (4) contracture of the muscles of the shoulder girdle that have been cut during the operative approach. Correction of faults causing pain upon motion of the scapula have been discussed above. Insistence upon full range motion of the arm and shoulder several times daily early in the postoperative course will prevent the formation of crippling subscapular and intra-articular adhesions. The responsibility for this care rests primarily upon the surgeon and secondarily upon the nursing staff. In patients where a deep wound infection results or when a Schede thoracoplasty is necessary for complete obliteration of an empyema mobilization of the shoulder and arm may be difficult and in these patients some excusable limitation of motion almost inevitably occurs. Free range of motion of the arm and shoulder should be the rule, however, and not the exception following thoracoplasty.

The post thoracoplasty convalescent period should require a period of six months as a minimum. The amount of rest necessary will be influenced by the (1) general condition of the patient, (2) type of lesion present (i.e., exudative or fibrotic), (3) rapidity of sputum conversion, (4) condition of the contralateral lung and (5) presence of important extrapulmonary tuberculosis. All of these factors must be carefully considered in respect to each individual patient. Many patients will require a period of years of rest before being able to return to useful economic living. The importance of this period of rest following thoracoplasty must be impressed upon the patient. At the same time the goal of eventual return to normal activity must be continually held before the patient. Many patients have lost their morale and their opportunity to re-enter society as normal persons because they developed an attitude of too much caution. All too often the blame for this unfortunate result must be laid upon the physician.

The majority of patients that have obtained sputum conversion following thoracoplasty should eventually become normal healthy citizens. Overholt found, in answer to a questionnaire sent to patients that had thoracoplasties five years or more, that 85 per cent considered themselves without deformity and were leading normal useful lives. Kinsella encourages his patients to look forward to normal living and requests all of his female patients who have had thoracoplasties to send him announcements when they deliver babies. He proudly keeps track of what he calls his "thoracoplasty babies."

Sufficient time has not elapsed to correctly evaluate the results of

the author's personal series. However, of 31 patients that had their thoracoplasties completed more than a year ago, 16 are well and working, 11 are well but are not yet working, and 4 are not well. Of the 4 patients not well, 3 have active tuberculosis in the contralateral lung and the remaining patient is a narcotic addict. One patient in this group who had an extensive nine rib thoracoplasty that needed a later revision to obtain cavity closure has returned to Alaska. In a recent letter he wrote "I feel much better, so much so that I am unaware of having a body at times. Seemingly I am ridding myself of the deadening leaden toxic feeling. My outlook is better and calmer. Recently I went on a five-day Moose hunt trip up the Chena River. It was a gruelling trip, for I had to push the boat over the worst rapids, pole and line it for miles and paddle 60 miles coming back. We slept under spruce trees like Indians and our boots froze stiff. Ice formed on the paddles until noon and it rained and snowed on us. We got a Moose and I packed my share." Not every patient would have the courage or strength to undertake such activity so soon following a thoracoplasty. Nor is it advisable that they should be so active. Nevertheless, the average patient having a thoracoplasty can look forward to years of vigorous health and bodily comfort.

SUMMARY

The modern extrapleural thoracoplasty has become a most effective collapse measure for the closure of tuberculous cavities. Most reports of the results of thoracoplasty deal with its main object, that is, cavity closure and sputum conversion. There are, unfortunately, certain sequelae of thoracoplasty that must be evaluated in a full appraisal of the end results of this procedure.

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patient; (2) the extensiveness of the thoracoplasty; (3) the degree of fibrosis of the underlying pleura; and (4) the manner in which the operative procedure is carried out.

Limitation of motion of the shoulder girdle and arm following extrapleural thoracoplasty is due to: (1) pain due to an ill-fitting scapula; (2) subscapular adhesions; (3) intra-articular adhesions; and/or (4) contracture of the muscles of the shoulder girdle that have been cut during the operative approach.

The post-thoracoplasty convalescent period should be a minimum of six months. The amount of rest necessary will be influenced by (1) the general condition of the patient, (2) type of lesion present (that is, exudative or fibrotic), (3) rapidity of sputum conversion, (4) condition of the contralateral lung and (5) presence of important extrapulmonary tuberculosis. The importance of this period of rest must be impressed upon the patient and, at the same time, the goal of eventual return to normal activity must be continually held before him. The majority of patients that have obtained sputum conversion following thoracoplasty should eventually become normal healthy citizens.

RESUMEN

La toracoplastia extrapleural moderna ha llegado a ser una forma de colapsoterapia sumamente eficaz para obtener el cierre de cavernas tuberculosas. La mayoría de los informes relativos a los resultados de la toracoplastia tratan de su objeto principal, esto es, del cierre de las cavernas y la conversión del esputo. Desgraciadamente, existen ciertas secuelas de la toracoplastia que es necesario avaluar para obtener un justoprecio completo de los resultados finales de este procedimiento .

Los principales efectos mecánicos de la toracoplastia que pueden contribuir a causar invalidez o incapacidad son: (1) dolor en el pecho o en el hombro; (2) escoliosis; (3) limitación del movimiento del hombro. El uso de la técnica correcta en la ejecución de la toracoplastia reducirá al mínimo la deformidad e incapacidad resultantes. La atención a los detalles en la asistencia postoperatoria evitará el dolor y la limitación del movimiento del hombro.

El dolor remanente después de una toracoplastia puede ser (1) constante o (2) presente solamente durante el movimiento del hombro. El dolor constante se debe a menudo a la contracción del pulmón fibroso o de la pleura engruesada subyacentes, o a neuritis intercostal causada por la compresión de nervios por los muñones de las costillas. El dolor que aparece solamente cuando se mueve el hombro se debe comúnmente al contacto del omoplato con algún hueso prominente.

Casi toda toracoplastia causa algún grado de escoliosis. Los si-

guientes factores influyen en el grado de escoliosis remamente: (1) la edad del paciente; (2) la extensión de la toracoplastia; (3) el grado de reacción fibrosa de la pleura subyacente, y (4) la manera como se lleva a cabo la operación.

La limitación del movimiento del hombro y del brazo después de la toracoplastia extrapleural se debe a: (1) dolor causado por el omoplato mal ajustado; (2) adherencias debajo del omoplato; (3) adherencias intrarticulares, y/o (4) contracción de los músculos del hombro cortados durante la operación.

El período de convalecencia postoperatoria debe durar un mínimo de seis meses. Los siguientes factores determinan la duración del período de descanso necesario: (1) el estado general del paciente, (2) el tipo de la lesión presente (esto es: exudativa o fibrosa), (3) la rapidez de la conversión del esputo, (4) el estado del pulmón contralateral y (5) la existencia de tuberculosis extrapulmonar importante. Debe inculcársele al paciente la importancia de este período de descanso y, al mismo tiempo, debe hacérsele presente constantemente el objeto del tratamiento, que es el regreso oportuno a las actividades normales. La mayoría de los pacientes toracoplastizados en los que se ha obtenido la conversión del esputo deben llegar a ser, con el tiempo, ciudadanos normales y sanos.

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Hexylresorcinol Solution in the Treatment of Tuberculous Empyema

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Tuberculous empyema is a relatively common complication of artificial and spontaneous pneumothorax. Its increased incidence is definitely related to the increased use of collapse therapy in the treatment of pulmonary tuberculosis. Manifesting itself in most cases as a pyopneumothorax, the condition usually results from either the tearing of adhesions into the visceral pleura, involving infected foci or cavities in the lung, or from the spontaneous rupture of pulmonary lesions into the pleural cavity.

Statistics indicate that pleuro-pulmonary adhesions complicate about 80 per cent of cases receiving pneumothorax treatment. Trauma to these adhesions, in connection with air refills, probably constitutes the important factor in the etiology of the pleural effusions occurring at some time or other in most patients. These effusions frequently become purulent. I. D. Bronfin[1] in 1933 reported 18.7 per cent of purulent effusions in a series of 176 patients receiving pneumothorax treatment over a period of five years. Various reports show an empyema incidence of 20 to 30 per cent in patients with pleural effusions complicating artificial pneumothorax.

Therapeutic procedures directed toward the sterilization of tuberculous empyema have included the use, both of irrigation and instillation, of various antiseptic and germicidal solutions. Chlorine preparations, solutions of metaphen, merthiolate and the sulfonamides as well as medicated oils, have been chiefly employed. Favorable clinical results have been reported with all of the agents mentioned. Beneficial results have also been observed following simple aspiration, with or without air replacement.

The closure of the bronchial fistula which frequently complicates the pyopneumothorax is often followed by prompt local and constitutional improvement. This observation must be taken into consideration in evaluating the effects of local therapy. On the other hand, it may be reasonable to assume that chemotherapy which will favorably influence the pathological involvement of the pleura may also promote healing of the fistulous opening.

Chlorine derivatives, because of their irritant effect, are not applicable in the presence of a bronchial fistula. The instillation of oils involves definite hazards.

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The disinfectant and non-irritant qualities of hexylresorcinol,* glycerin-aqueous solution, suggested the possibilities of its usefulness in tuberculous empyema. Its beneficial effects in a small series of cases constitute the basis of this report. The solution is apparently well tolerated by the pleura, since no toxic or inflammatory manifestations were observed in connection with its use. Its employment in the presence of a bronchial fistula was not attended by any untoward symptoms. Thick pus, difficult to aspirate, rapidly thinned and tended to become serous in character following several irrigations and instillations. Its use in draining sinuses complicating radical surgical procedures for empyema also appeared to be beneficial.

Treatment consisted of removal of as much of the purulent exudate as possible, irrigation of the empyema cavity with the solution, followed by the instillation of from 20 to 200 cc., depending upon the size of the pleural space. This procedure was repeated as often as necessary, usually once a week.

The following case reports are cited:

Case 1—M. R., age 27, was admitted on September 2, 1937, with a diagnosis of chronic pulmonary tuberculosis, far-advanced B. The x-ray films showed a fibro-ulcerative involvement of the upper halves of both lung fields, with a medium sized cavity in the right upper lobe. The sputum was positive for tubercle bacilli.

Artificial pneumothorax, instituted on the right side the day following his admission, resulted in only a partial collapse, due to adhesions to the upper lobe. Closure of the cavity was nevertheless obtained, and his condition showed a progressive improvement.

On January 19, 1938, he developed a serous effusion which accumulated rapidly, necessitating aspiration at frequent intervals.

On November 26, 1938, the effusion was noted as turbid, but his general condition remained good.

On May 8, 1939, the patient suddenly complained of dyspnoea, pain in the right chest and epigastrum, vomiting, chills and fever. Thoracentesis revealed an increased intrapleural pressure, with a purulent exudate containing streptococci and staphylococci. An x-ray film showed a complete collapse, due to a spontaneous pneumothorax, of the right lower lobe, and 50 per cent collapse of the upper lobe.

The febrile course continued until August 26, 1939, despite frequent pleural aspirations and irrigation with various antiseptic preparations, including the use of neoprontosil liquid locally and intramuscularly over a period of a month. A transfusion of 500 cc. of citrated blood given on this date was followed by a rapid and striking clinical improvement. The fever rapidly subsided and the exudate decreased. Aspiration and irrigation with normal salt solution and various antiseptics was continued at irregular intervals.

On May 29, 1940, a phrenic nerve crushing was performed, to decrease

*Sharp & Dohme.

the size of the empyema cavity. The purulent exudate continued to accumulate, however, and the lung showed no tendency to expand.

Oleothorax was tried from June to November, 1940, with no definite local improvement. The pus became thick and difficult to remove. Febrile paroxysms occurred at irregular intervals.

On November 14, 1940, the empyema cavity was irrigated with hexylresorcinol solution 1:1000, followed by the instillation of 50 cc. This procedure was repeated at intervals of about one week, until December 26, 1940, at which time aspiration revealed a clear, amber-colored fluid. Gradual expansion of the lung occurred, with total obliteration of the empyema space.

Case 2—Miss A. H., age 29, reported for a pneumothorax refill on May 29, 1938, following her dismissal from a sanitarium in Los Angeles. She gave a history of bilateral pneumotherapy. Collapse of the left lung, begun in 1933, was followed by pleural effusion in 1934, which became purulent in 1936. Pneumothorax on the right side started in 1934 was discontinued in 1936.

The x-ray film showed a fibro-ulcerative lesion in the right upper lobe, also an interlobar effusion at the level of the 7th rib posteriorly on the left side, which, upon aspiration, revealed a thick, purulent exudate, difficult to remove, containing tubercle bacilli. The sputum was positive.

Attempts to remove the pus and replace with air at intervals of once a month were discontinued on October 2, 1939, owing to febrile reactions and severe pain which followed the treatment.

On April 26, 1940, she developed two small abscesses at the level of the fourth rib, near the left costo-sternal junction.

On May 11, 1940, she complained of dyspnoea and severe pain in the left chest. About 10 cc. of thick pus was aspirated. Pus apparently of a similar character was aspirated from the abscesses mentioned. Symptomatic improvement followed. This procedure combined with irrigation and instillation of various antiseptic solutions was continued at weekly intervals until August, 1940, with no definite improvement.

On August 6, 1940, the empyema space was irrigated with hexylresorcinol solution, followed by instillation of 20 cc. This procedure, repeated at intervals of once or twice a week, was followed by thinning of the pus. Aspiration of the pleural space on June 20, 1941, revealed a serous fluid. The abscesses healed.

Case 3—Miss G. P., age 28, was admitted on July 25, 1940, with a diagnosis of pulmonary tuberculosis, far-advanced B, complicated by a complete right thoracoplasty with draining sinuses of fours years' duration, at the level of the 7th and 8th ribs, in the axillary line. The x-ray film showed a small cavity in the left infra-clavicular area.

She gave a history of artificial pneumothorax started in 1935, but discontinued after three refills because of pleural effusion which later became purulent.

In June, 1936, a thoracoplasty was performed for the treatment of the tuberculous empyema.

Following her admission, the draining sinuses were irrigated every second day with Dakins' solution, with no beneficial effect.

On November 14, a phrenic exeresis was performed to stop the movement of the right diaphragm.

On December 4 the sinuses were probed and irrigated with hexylresorcinol. This was repeated on December 8, and at weekly intervals there-

after, resulting in complete healing of the involved areas on March 10, 1941. The sinuses remain healed to date.

Case 4—J. B., age 24, was admitted on May 8, 1940, with a diagnosis of pulmonary tuberculosis, far-advanced B. X-ray films of the chest showed extensive involvement of the right lung, with numerous small and medium-sized cavities, also infiltration of the left upper lobe.

The results of pneumotherapy on the right side, started on May 15, 1940, were not satisfactory. A film taken on June 20 showed an 80 per cent collapse of the upper lobe, and a 20 per cent collapse of the lower lobe. Three cavities were noted in the upper lobe, and three in the lower lobe, one of which was of the "balloon type."

On June 26, a phrenic nerve crushing was done, in an effort to improve the collapse, without beneficial effect.

On August 27, 1940, eight days after a refill, he complained of chills, dyspnoea, and pain in the right upper quadrant of the abdomen. His temperature was 104, pulse 128, and respiration 36. X-ray showed an almost total collapse of the right lung, with marked shifting of the mediastinum toward the left. Repeated removal of air from the pleural cavity sufficed to control the dyspnoea.

The purulent exudate which rapidly developed contained tubercle bacilli.

His fever subsided on October 20, but the pus continued to rapidly accumulate. On January 23, 1941, 500 cc. of pus was aspirated, and the pleural cavity irrigated with hexylresorcinol and 120 cc. instilled. This was followed by a decrease in the exudate. On February 6, 100 cc. was removed, and 150 cc. of the solution instilled. The patient commented on "the sweetish taste" of the fluid upon expectoration.

The procedure was repeated on February 19. Aspiration of 100 cc. of the exudate on March 13 showed definite thinning and clearing. The fluid at present remains at the level of the 10th rib, and is somewhat turbid. A moderate amount of lung expansion has taken place. Thoracoplasty is under consideration.

Case 5—G. A., age 24, male, developed symptoms of pulmonary tuberculosis in June, 1939. X-ray taken on July 7, 1939, revealed moderately advanced tuberculosis, with cavitation involving the upper lobe of the left lung. Sputum was positive.

Artificial pneumothorax was started on September 15, 1939. A 30 per cent collapse was obtained, with partial closure of cavity, which was reduced from about 3 cm. in diameter to 1 cm. Further closure was prevented by several band adhesions. On March 1, 1940, an internal pneumolysis was done. The cavity closed completely and the lung was collapsed about 70 per cent. One week postoperatively a serous pleural effusion developed rapidly, filling almost the entire pneumothorax space. The patient developed a temperature ranging from 100° to 103°; respirations 30, and pulse rate of 120. Aspirations were done two to three times a week during the following month, and the febrile symptoms gradually subsided. A small amount of fluid which remained was finally absorbed during September, 1940. Pneumothorax was continued.

On December 1, 1940, the patient began to have excessive fatigue, evening rise of temperature and chest pain. Fluoroscopy revealed a recurrence of the pleural effusion. Aspiration revealed a purulent fluid. A few days later the temperature rose to 103°. Direct smears of the pus revealed tubercle bacilli. No other organisms were present on culture.

Weekly aspirations were necessary. The pleural space was irrigated with normal saline solution, and hexylresorcinol solution full strength 30 cc. was injected. This was continued at weekly intervals for five months. The exudate gradually diminished and changed from a very thick, purulent type to a thin, serous fluid. Because of threatened obliteration of the pneumothorax space, hexylresorcinol was discontinued and oleothorax was instituted on about June 1, 1941. After a few weeks the effusion again became purulent and inasmuch as the obliterative process was apparently progressive, the oleothorax was abandoned, and use of hexylresorcinol resumed. The effusion soon became serous again, gradually diminishing in amount, and finally disappearing about January 1, 1942. Complete obliteration of the pneumothorax space has taken place.

Case 6—M. L., age 37, female, was diagnosed a case of far-advanced pulmonary tuberculosis in November, 1939. The x-ray film revealed an extensive lesion in the right lung, with a large cavity in the lower lobe. Her sputum was positive for tubercle bacilli.

On November 18, artificial pneumothorax was established, with an initial injection of 250 cc. of air. In February, 1940, she developed a pleural effusion which accumulated rapidly and required frequent aspirations. The effusion became purulent during the latter part of March and was associated with a rise in temperature, as high as 104°. In April, because of the thickness of the pus and the difficulty of aspiration tube drainage was instituted. A month later a portion of the ninth rib was resected in the posterior axillary line, following which the empyema drained profusely, requiring six or seven dressing pads a day.

The drainage continued, although the patient's general condition showed a progressive improvement. An x-ray film taken on April 29, 1941, showed a pyopneumothorax with a 50 per cent collapse of the lung and a fluid level at the ninth rib.

Following consultation with Dr. Ross Van Pelt, her attending physician, daily irrigations and instillations of hexylresorcinol solution were commenced on April 30. A definite decrease and thinning of the pus was noted after the tenth day. The irrigations were continued daily for one month, following which they were given at intervals of three times per week, until June 27, when the pleuro-cutaneous fistula closed.

An x-ray film taken on August 11, 1942, shows a complete re-expansion of the right lung with some pleural thickening over the lower lobe.

These observations appear to indicate that hexylresorcinol solution will prove to be a valuable addition to the agents recommended in the local treatment of tuberculous empyema.

SUMMARY

Tuberculous empyema is a relatively common complication of artificial and spontaneous pneumothorax. Its increased incidence is directly related to the increased use of artificial pneumothorax in the treatment of pulmonary tuberculosis. Trauma to pleural adhesions encountered in about 80 per cent of pneumothorax cases is probably the important cause of the pleural effusions which subsequently become purulent. The beneficial effects of hexylresorcinol solution, 1:1000 in a small series of cases, furnishes the basis for this report. Treatment consisted of simple aspiration of the puru-

lent exudate, irrigation with the solution, followed by instillation of from 20 to 200 cc. depending upon the size of the empyema cavity. Clinical results apparently indicate that this solution can be regarded as a valuable addition to those recommended for the local treatment of tuberculous empyema.

RESUMEN

El empiema tuberculoso es una complicación relativamente común tanto del neumotórax artificial como del espontáneo. El aumento en la frecuencia del impiema guarda una relación directa con el acrecentamiento en el uso del neumotórax artificial en el tratamiento de la tuberculosis pulmonar. El traumatismo de las adherencias pleurales que se encuentran en un 80 por ciento de los casos de neumotórax es probablemente la causa de más importancia de los derrames pleurales que vuélvense purulentos subsiguientemente. Los efectos beneficiosos de la solución de hexilresorcinol, 1:1000, en una pequeña serie de casos, suministra la base para este informe. El tratamiento consistió en la aspiración simple del exudado purulento, la irrigación con la solución, seguida después por la instilación de 20 a 200 cc. según el tamaño de la cavidad del empiema. Los resultados clínicos indican aparentemente que puede considerarse esta solución como una adición valiosa a las otras que se recomiendan en el tratamiento local del empiema tuberculoso.

185 N. Wabash Avenue.

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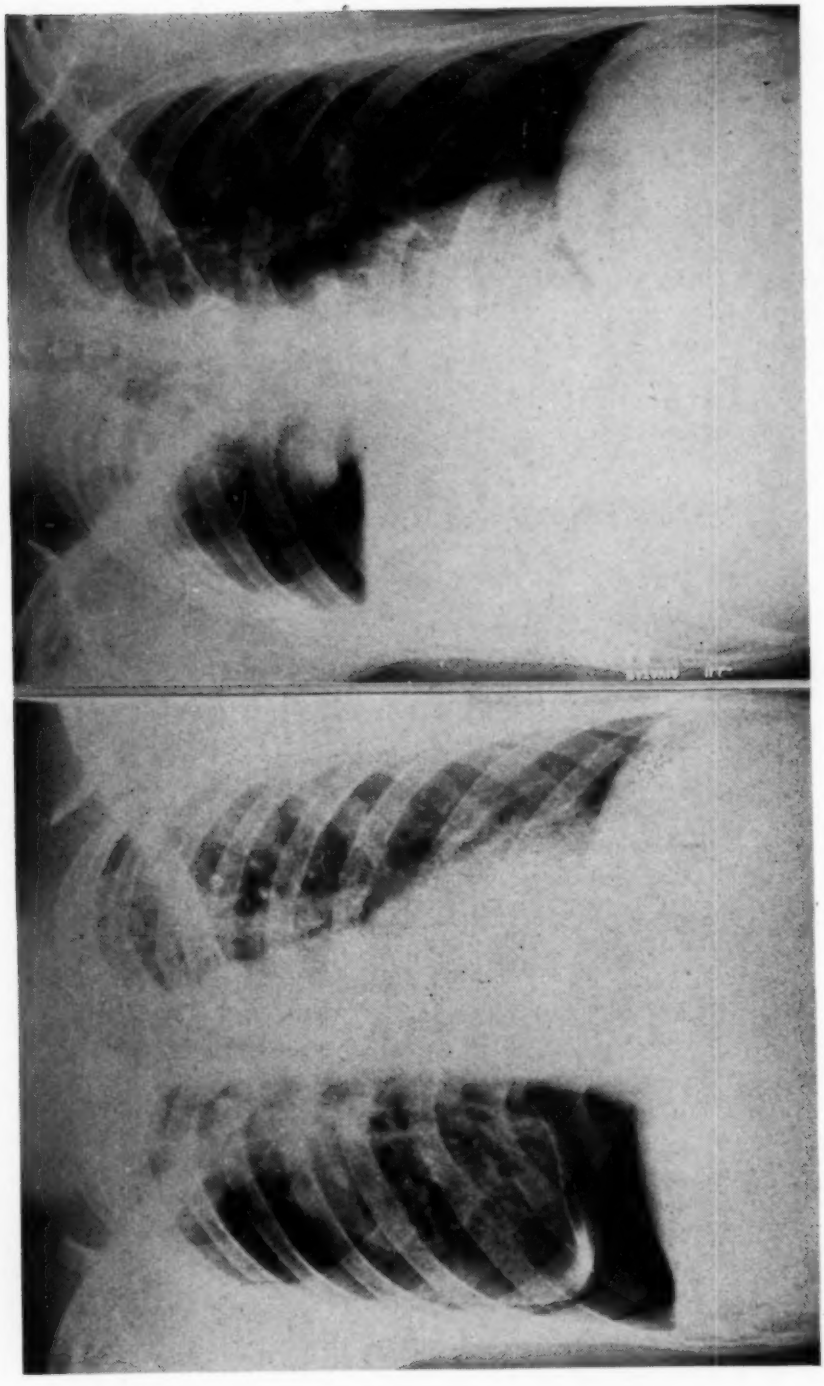
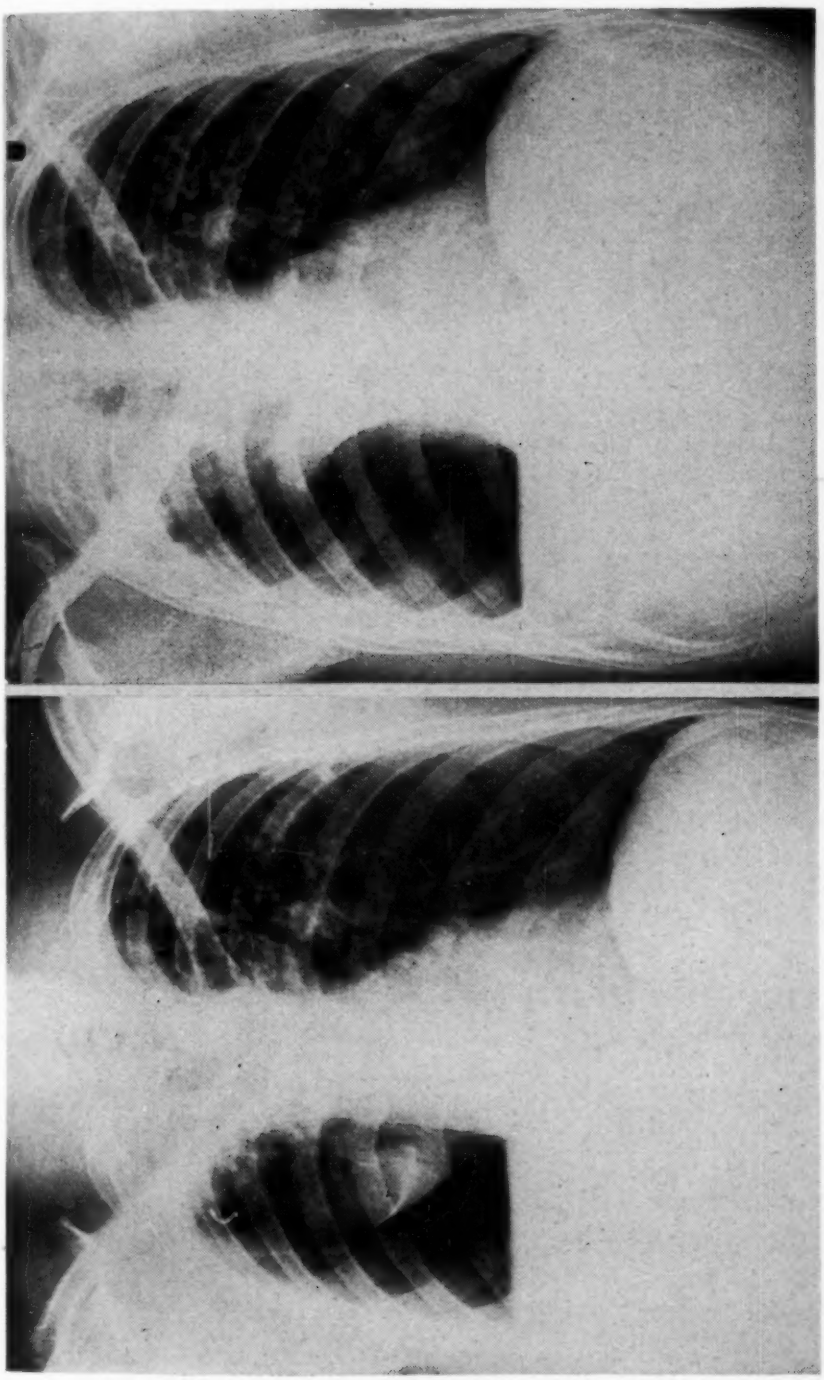
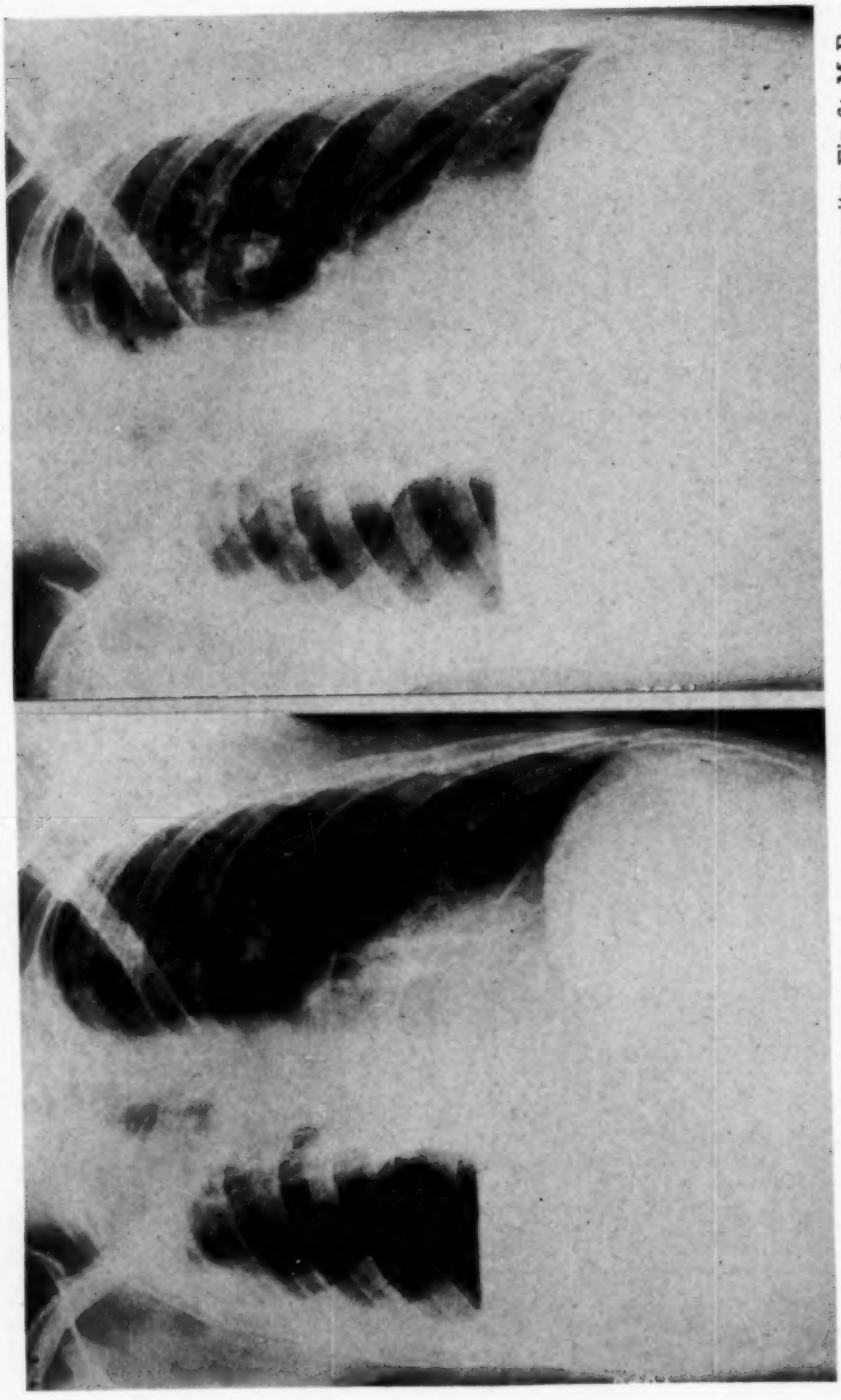


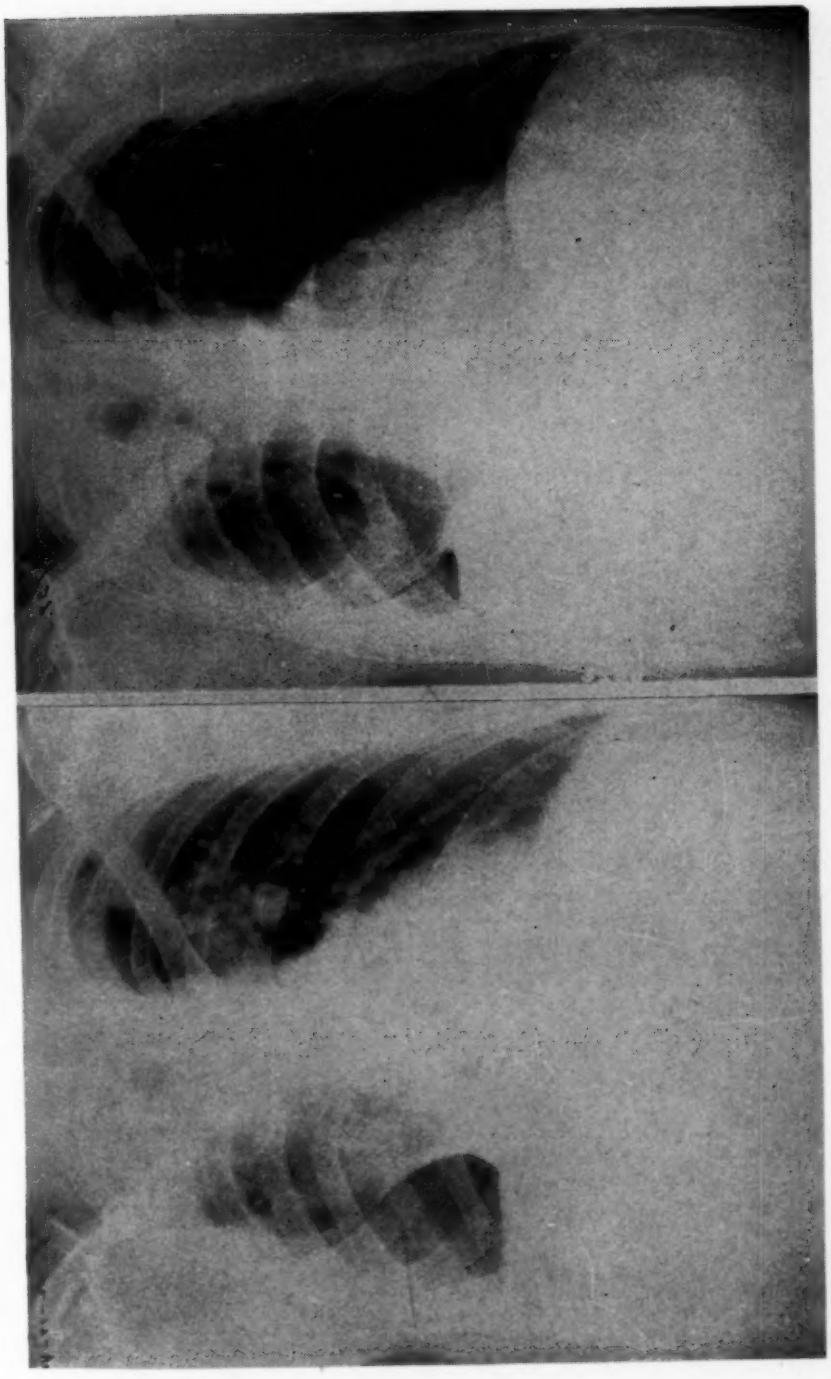
Case 1—Fig. 1: M. R.—Onset of pleural effusion. Fig. 2: M. R.—Developed turbid effusion.



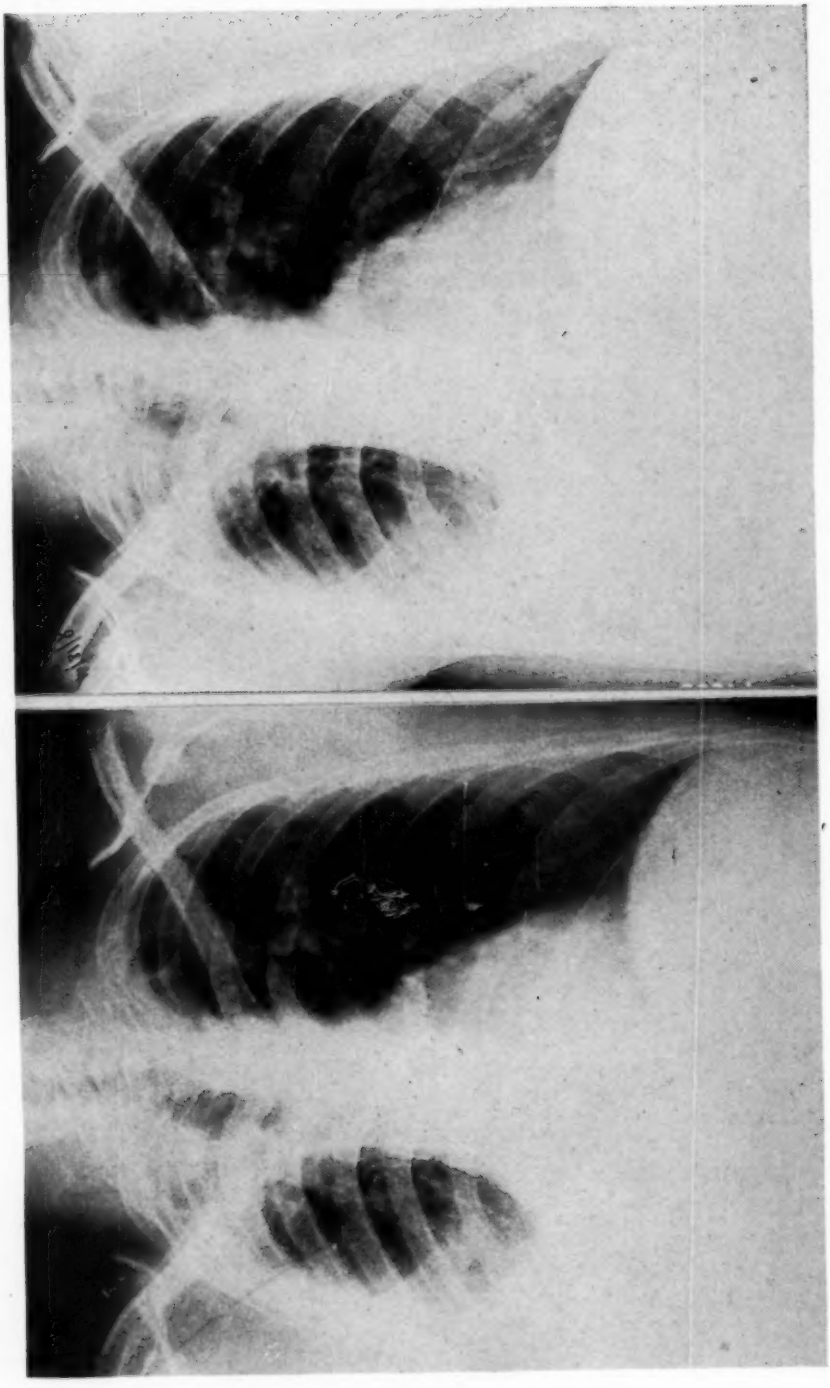
Case 1—Fig. 3: M. R.—Complete collapse of right lower lobe due to a spontaneous pneumothorax. Fig. 4: M. R.—Pyopneumothorax with collapse of right lower lobe; film taken following aspiration.



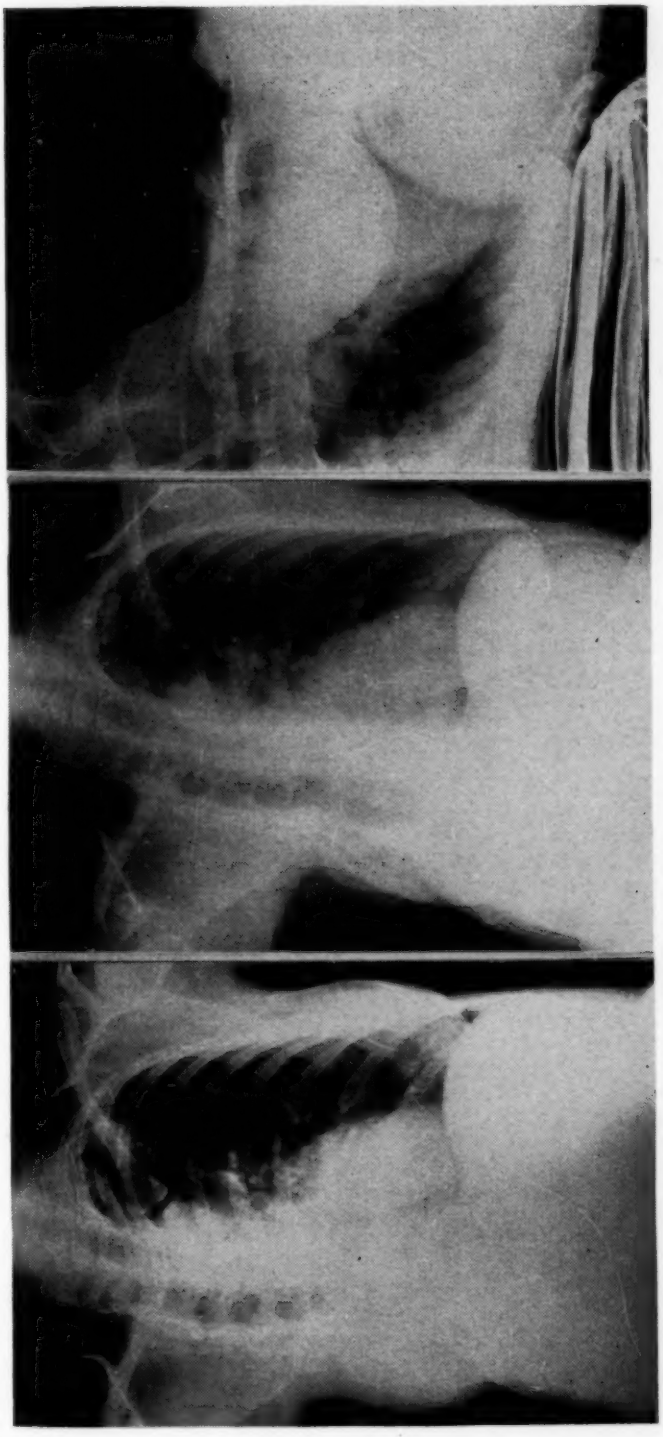
Case 1—Fig. 5: M. R.—Film taken after phrenic nerve crush showing slight decrease in size of empyema cavity. Fig. 6: M. R.—Oleothorax.



Case 1—Fig. 7: M. R.—After irrigation with hexylresorcinol over a period of 1 month. Fig. 8: M. R.—Lung expansion after 3 months.

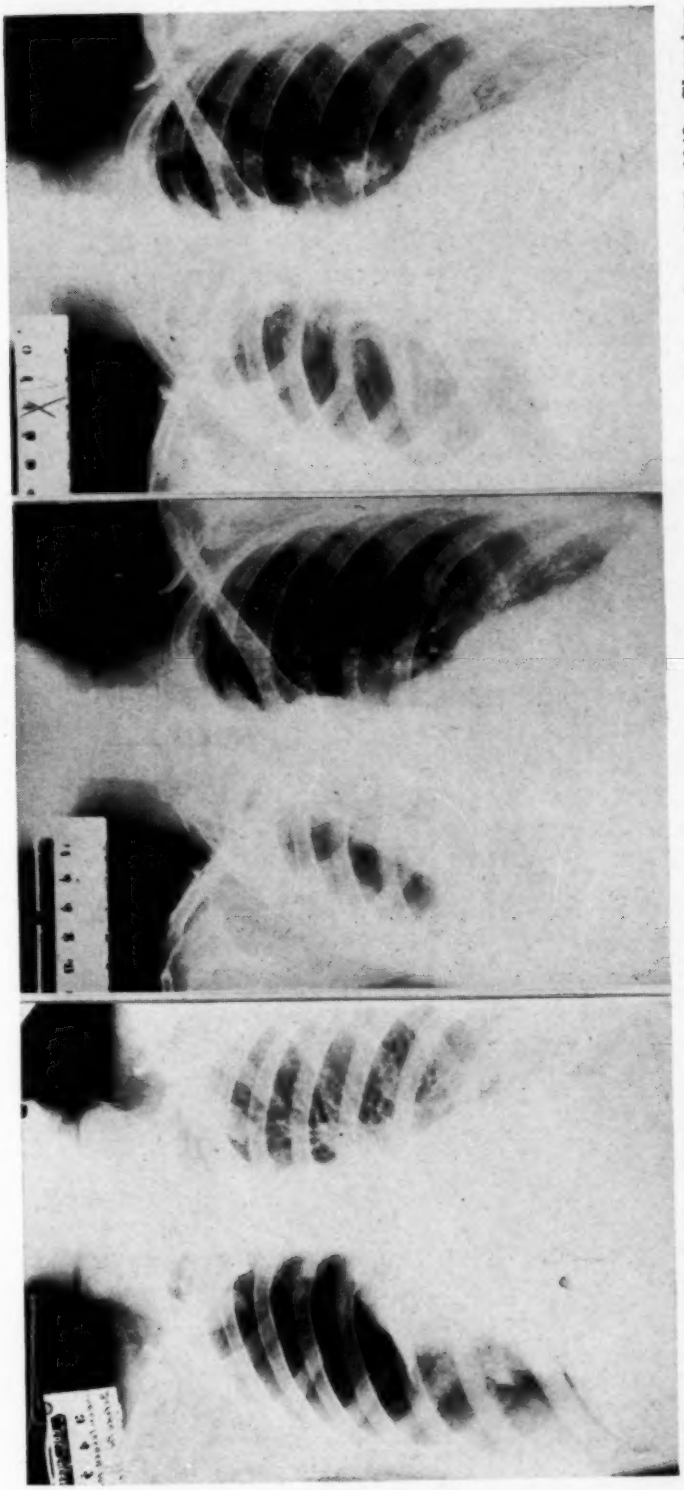


Case 1—Fig. 9: M. R.—Obliteration of empyema cavity 2 months later. Fig. 10: M. R.—Film taken 4 months later.



Case 3—Fig. 1: G. P.—Film taken on admission. Fig. 2: G. P.—Film taken after Lipiodol injection in upright position. Fig. 3: Film with Lipiodol in horizontal position.

Case 3—Fig. 4: G. P.—Film after Lipiodol injection in horizontal position tilted forward. Fig. 5: G. P.—Film taken after closure of draining sinus. Fig. 6: G. P.—Film taken 14 months after healing of empyema.



Case 6—Fig. 1: M. L.—Tension pneumothorax. Fig. 2: M. L.—Pyopneumothorax. Fig. 3: M. L.—Taken August 11, 1942. Showing lung expansion with eradication of empyema cavity.

Woodward High School Survey*

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In 1937 the Medical and Program Committee of the Anti-Tuberculosis League planned and initiated a program for Woodward High School.

The purpose of such a survey was three-fold:

1) To demonstrate the value or lack of value of a tuberculin testing program as a method of case finding in high schools.

2) To do an experimental case finding program where not only the students with positive tuberculin reactions were followed, but also the household members of these students.

3) To check the validity of the tuberculin test as a case finding method as compared with the x-ray or physical examination.

Woodward High School was chosen for three reasons:

1) Woodward High School, in 1931, had a registration of approximately 50 per cent Negro students.

2) Woodward High School serves the great majority of people in the lower economic group, especially from the "basin" of the city where the incidence of tuberculosis is highest.

3) The faculty of this high school was anxious to cooperate since several students had been compelled to leave school because of active cases of tuberculosis.

A great deal of preliminary planning was necessary before such a program could be put into effect. The Board of Education, The Academy of Medicine, and the Cincinnati Board of Health were contacted and their cooperation secured. A nurse, Miss Virginia Vettle, and a physician, Dr. Leo Wertheimer, were employed for this special project. The entire program was to be financed by the Christmas Seal Committee.

The plan for the survey was as follows:

1) For the school years 1937-38 and 1938-39 the survey was a particular project of the eleventh grade, Dr. Werthimer doing the tuberculin testing and physical examinations in 1937-38 and Dr. L. B. Owens making the examinations in 1938-39.

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2) A tuberculin test, using P. P. D. (Purified Protein Derivative), was to be done for each child presenting a request slip.

3) All students were to be x-rayed at the Health Center regardless of the reaction of the tuberculin test.

4) A physical examination was to be done on all students who had the tuberculin test by the physician especially employed for this project.

5) If the tuberculin test was positive, or the x-ray findings showed any evidence of prior tuberculous infection, the family was visited by the nurse and urged to come in for a tuberculin test, an x-ray, and a physical examination.

6) In cases where the family had a private physician, the findings were to be sent to the private physician and the patient was instructed to contact him.

On October 18, 1937 the tuberculin testing program for the school year 1937-38 was formally started at Woodward High School under the auspices of the Anti-Tuberculosis League, the Cincinnati Board of Health and the Christmas Seal Committee. An auditorium session was held for the eleventh grade students at which the sound movie "Behind the Shadow" was shown. Mrs. Blanche R. Miller discussed the tuberculin testing program and asked their cooperation. Request slips for parents to sign in order that the students might have the tuberculin test were handed to the members of the eleventh grade.

The background of communicable diseases and their method of transmission was presented, finally entering into a discussion of tuberculosis as one of the most tragic of the communicable diseases. We then discussed in some detail with the students the symptoms, methods of diagnosis, treatment, and, most important, the prevention of tuberculosis.

The educational program took a great deal of time but proved to be extremely worthwhile, for the success or failure of such a survey depends entirely upon the cooperation of the student body. More important was the fact that the students received a definite lesson in health education.

Those students found in the survey who were put under observation were referred to the nurse at Woodward High School. If physical activities were to be curtailed, or extra food was indicated, the recommendation was made to the school and carried out as far as possible. These recommendations were also explained to the family by the nurse.

Many defects were found on physical examination, the principal ones being defective teeth and diseased tonsils. In every case reports of these physical findings were given to the public health nurse, who made every possible attempt to have them corrected.

Each public health nurse in whose district a suspicious, an active or an arrested tuberculosis case lived, was given a full report of the case and the contacts. In this manner, the services which were started in the school survey were continued, and handled in keeping with good public health procedures.

A total of 501 eleventh grade Woodward High School students were studied in this survey, of which 372 were white and 129 were Negro.

DISTRIBUTION OF STUDENTS ACCORDING TO AGE

	15 yrs.	*16 yrs.*	*17 yrs.*	*18 yrs.*	*19-20 yrs.*	
White	6.0%	42.0%	39.0%	11.0%	2.0%	
	15 yrs.	*16 yrs.*	*17 yrs.*	*18 yrs.*	*19 yrs.*	*20-21 yrs.*
Negro	2.0%	34.0%	38.0%	19.0%	5.0%	2.0%

TABLE NO. 1

PERCENTAGE OF GROUPS TUBERCULIN TESTED

Race	*Number*	*Number T. T.*	*Percent*
White	372	350	94.1
Negro	129	128	99.1
Total	501	478	95.4

The high percentage of both white and Negro students tuberculin tested was largely due to the excellent educational program conducted by the Cincinnati Anti-Tuberculosis League.

TABLE NO. 2

TUBERCULIN TEST ACCORDING TO RACE AND SEX

Race and Sex	*Number Tested*	*Pct. Neg. P.P.D. No. 1 & 2*	*Pct. Pos. P.P.D. No. 1*	*Pct. Pos. P.P.D. No. 2*	*Pct. Pos. P.P.D. No. 1 & 2*
White girls	182	50.7	20.2	29.1	49.3
White boys	168	50.7	20.2	29.1	49.3
Total whites	350	50.7	20.2	29.1	49.3
Negro girls	73	34.0	40.0	26.0	66.0
Negro boys	55	22.0	51.0	27.0	78.0
Total Negroes	128	28.9	44.5	26.6	71.1

The results of the tuberculin test were exactly the same in the white boys and girls.

In the Negro, the boys showed a higher percentage of positives than the girls (12%).

A significant difference exists between the white and Negro groups: 49.3 per cent positive P.P.D. No. 1 and 2 in the whites and 71.1 per cent positive P.P.D. No. 1 and 2 in the Negro.

The Negro group was much more sensitive to P.P.D. No. 1 than the white group; 44.5 per cent positive in the Negroes and 20.2 per cent positive in the whites.

TABLE NO. 3

X-RAY DIAGNOSIS

Number and Race	*Negative*		*Primary Infection Healed*		*Pulmonary Tuberculosis Healed*		*Primary Infection Active*		*Pulmonary Tuberculosis Active*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
372 White	43	11.5	313	84.13	4	1.1	11	3.0	1	0.27
129 Negro	16	12.4	96	74.4	1	0.8	12	9.3	4	3.10
501 Total	59	11.78	409	81.63	5	1.0	23	4.59	5	1.0

The x-ray findings in the total group of 1.0 per cent healed pulmonary tuberculosis and 1.0 per cent active pulmonary tuberculosis is about what one would expect to find in this particular group. (Lower economic group.)

The incidence of healed primary infection 84.13 per cent for the whites is higher than the 74.4 per cent found in the Negroes; the healed pulmonary tuberculosis is only slightly higher in the whites than in the Negroes.

The significant difference in the findings of the whites and Negroes is in the active cases of primary infection and the active cases of pulmonary tuberculosis, these findings being much higher in the Negroes than the whites.

Active pulmonary tuberculosis found in the Negroes was 3.10 per cent, and in the whites only 0.27 per cent, showing that active pulmonary tuberculosis occurred 11.5 times as frequently in the Negro as in the white students.

The most striking and significant finding in the whole survey is the 3.10 per cent of active pulmonary tuberculosis found in the Negro students.

Active primary infection found in the Negro was 9.3 per cent; in the whites 3.0 per cent showing that active primary infection oc-

curred 3.1 times as frequently in the Negro as in the white students. This latter group is very often not found, or is overlooked in ordinary routine surveys. Any child, white or Negro, with active primary tuberculous infection should be carefully followed in a chest clinic for a period of several years with special emphasis on frequent x-rays, controlled physical activity at home and in school, and a program of rest and nutrition. Such a program will often see a child through this dangerous period and build up resistance against the more dangerous reinfection or adult type of pulmonary tuberculosis.

A total of 23 students, 4.59 per cent, in the Woodward High School survey were carefully studied and followed. An educational program was provided for the parents of these students, with the result that at the present time we do not know of a single case in this group that developed active pulmonary tuberculosis, and practically all showed definite improvement physically as well as definite x-ray evidence of improvement.

(b) Two of these cases later developed active pulmonary tuberculosis:

One case, D. T., a white female, 18 years, showed no activity in the Woodward High School survey on January 10, 1938. Films in September, 1938 showed that the patient had a pleural effusion at the left base. Films on April 27, 1939 showed definite pulmonary pathology. She was admitted to the Hamilton County Tuberculosis Hospital on May 26, 1939. Diagnosis: Pulmonary tuberculosis, far advanced, active pneumonic type—preceded by pleural effusion. Patient died November 6, 1939. No known contact in the family.

Another case, E. W., a Negro male, 18 years, showed no activity in the Woodward High School survey on November 22. 1937. Admitted to the Hamilton County Tuberculosis Hospital on October 9, 1939. Died May 4, 1941. Diagnosis: Pulmonary tuberculosis, far advanced, active, pneumonic type. Family history of pulmonary tuberculosis.

(c) *Five Active Cases of Pulmonary Tuberculosis in Survey:*

Case, J. M., a white male, 18 years, P.P.D. No. 1 and 2—Negative Diagnosis: Pulmonary tuberculosis, minimal, active. Admitted to the Hamilton County Tuberculosis Hospital on May 20, 1939; discharged October 12, 1939. No known contact. Physical examination, negative.

Case, F. R., a Negro male, 19 years, P.P.D. No. 1—Positive. Diagnosis: Pleurisy with effusion. Admitted to Hamilton County Tuberculosis Hospital on February 9, 1938; discharged on September 11, 1938. Family history of tuberculosis. Physical examination, positive.

Case, J. McC., a Negro male, 17 years, P P.D. No. 1—Positive. Diagnosis: Pulmonary tuberculosis, far advanced, active, probably pneu-

TABLE NO. 4

CORRELATION OF X-RAY DIAGNOSIS WITH THE TUBERCULIN TEST

X-Ray Diagnosis (a)	Race	Total No.	Tuberculin Test—P.P.D. Negative No. 1 & 2 No.	%	Positive No. 1 No.	%	Positive No. 2 No.	%	Positive No. 1 & 2 No.	%
Negative	White	42	26	62.0	6	14.0	10	24.0	16	38.0
Group	Negro	16	4	25.0	8	50.0	4	25.0	12	75.0
Primary Infection,	White	292	144	49.0	61	21.0	87	30.0	148	51.0
Healed (b)	Negro	95	30	32.0	40	42.0	25	26.0	65	68.0
Pulmonary Tuberculosis,	White	4	2	50.0	2	50.0	—	—	2	50.0
Apparently Arrested	Negro	1	1	100.0	—	—	—	—	—	—
Primary Infection,	White	11	4	36.0	2	18.0	5	46.0	7	64.0
Active (c)	Negro	12	2	16.0	5	42.0	5	42.0	10	84.0
Pulmonary Tuberculosis,	White*	1	1	100.0	—	—	—	—	—	—
Active	Negro	4	—	—	4	100.0	—	—	4	100.0

(a) X-Ray Diagnosis:
Negative Group—No ghons or calcification in the hilum.
Primary Infection, Healed—Calcification present—no evidence of activity.
Pulmonary Tuberculosis, Apparently Arrested—Healed parenchymal lesion. No activity.
Primary Infection, Active—Large hilum shadows—Caseocalcareous nodes.
Pulmonary Tuberculosis, Active—Adult type.
*Tuberculin Test positive Feb. 18, 1942.

monic type. Admitted to Hamilton County Tuberculosis Hospital on April 25, 1939; died on July 23, 1939. No known contact. Physical examination, positive.

Case, C. G., a Negro male, 18 years, P.P.D. No. 1—Positive. Diagnosis: Pulmonary tuberculosis, minimal, active. Hospitalization advised—refused. Patient placed under care of private physician. Contact of J. McC. (preceding case). Physical examination, negative.

Case, S. H., a Negro female, 16 years, P.P.D. No. 1—Positive. Diagnosis: Pulmonary tuberculosis, far advanced, active, pneumonic type. Admitted to Hamilton County Tuberculosis Hospital on February 27, 1939. "French Leave" (left without permission), October 19, 1940. Family history of tuberculosis. Physical examination, positive.

Of the five active cases of pulmonary tuberculosis found in the survey, three cases or 60 per cent had positive finding on physical examination. The two cases of minimal tuberculosis had negative findings on physical examination.

The one case of minimal tuberculosis in the white male had a negative tuberculin test to both P.P.D. No. 1 and No. 2 in the survey, but had a positive test on Feb. 18, 1942.

The four cases of active tuberculosis in the Negro students had positive tuberculin test to P.P.D. No. 1.

TABLE NO. 5

FAMILY FOLLOW-UP FOR X-RAY EVIDENCE OF TUBERCULOSIS

Number and Race—Students	*Total Number in Household*	*Follow-up of Household*		*Pulmonary Tuberculosis—Arrested*		*Pulmonary Tuberculosis—Active*		*Primary Infection—Active*		*Primary Infection and Pulmonary Tuberculosis—Active Needing Follow-up*	
		No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
372 Whites	1423	302	22.1	21	7.0	1	0.33	2	0.66	3	1.0
129 Negroes	567	165	29.1	4	2.5	1	0.6	4	2.5	5	3.0

Of the 302 white household members followed 162 or 53.6 per cent were adults and 140 or 46.4 per cent were children.

Of the 165 Negro household members followed 85 or 54 per cent were adults and 76 or 46 per cent were children.

The 22.1 per cent follow-up of white and 29.1 per cent follow-up of Negro household members of students in this study is approximately the same as that of similar surveys conducted by other in-

vestigators. However, a much larger percentage of household members examined would have been desirable.

As one would expect, the percentage of apparently arrested (healed) pulmonary tuberculosis is much higher in the whites than in the Negroes, being 7.0 per cent for the whites and 2.5 per cent for the Negroes.

Of the 21 cases of apparently arrested pulmonary tuberculosis in the white group of household members, all were adults; 14 were mothers; 6 fathers and 1 stepfather. It was interesting to note that the mother and father in one family and the mother, sister and father in another family were all diagnosed as minimal apparently arrested cases. Nineteen of the 21 cases were diagnosed as minimal; one moderately advanced and one far advanced pulmonary tuberculosis—apparently arrested.

There was one case of minimal pulmonary tuberculosis, activity undetermined, in the white group occurring in a sister 19 years of age.

Twenty-one cases of apparently arrested pulmonary tuberculosis occurring among 162 white adults figures approximately 13.0 per cent, which seems quite high.

Of the four cases of apparently arrested pulmonary tuberculosis in the Negro group of household members, three were adults and one a female of 13 years. The three adults consisted of a mother, father and a stepfather.

It was interesting to note that the stepfather with minimal pulmonary tuberculosis, apparently arrested, and a mother with pulmonary tuberculosis, far advanced, active, occurred in one family of this small group.

Three cases of apparently arrested pulmonary tuberculosis occurring among the 85 Negro adults figures approximately 3.5 per cent, which is much lower than among the white adult group of household members.

Among the entire group of 302 white household members checked by x-ray examination, there was a total of three cases of active primary infection and active pulmonary tuberculosis which amounts to 1.0 per cent of these cases, that should be carefully watched. In the 165 Negro household members there was a total of five cases of active primary infection and active pulmonary tuberculosis which amounts to 3.0 per cent, that should be carefully watched.

Table No. 5 clearly shows when compared with Table No. 3 that the examination of household members was not as fruitful in the finding of active primary infection and active pulmonary tuberculosis cases as were the results of the examination of the Woodward High School students.

On the other hand the examination of the household members of

both white and Negro groups yielded a much higher percentage of pulmonary tuberculosis—apparently arrested cases, than did the examination of the students. This naturally would be expected due to the large number of adults in the former group.

REPEAT X-RAY FILMS REQUESTED

Of forty-three white students for whom repeat films were requested at a specified time, only eleven, or approximately 25 per cent, were taken within the specified time. Of nine members of their household for whom repeat films were requested, only two or approximately 22 per cent were taken within the specified time.

Of thirty Negro students where repeat films were requested at a specified time, eighteen or approximately 60 per cent were taken within the specified time. Of twelve members of their household where repeat films were requested, five, or approximately 42 per cent, were taken within the specified time. From this one would judge that the Negroes were somewhat more cooperative than the whites.

DISCUSSION

1) The entire program consisted of tuberculin testing, physical examination and x-raying of 501 eleventh grade students of Woodward High School during the schools years 1937-1938 and 1938-1939. A total of 467 household members of these students also were studied in this survey, making a grand total of 968 individuals in the entire study.

The cost of the entire program was financed by the Christmas Seal Committee. The total expenditure was approximately $5000; therefore, one might figure that there were 5 active cases of pulmonary tuberculosis found among the eleventh grade Woodward High School students, which would amount to $1000 per case.

One must remember that a total of 968 individuals were examined —501 students and 467 household members. The cost should be prorated to approximately $2600 for the students and approximately $2400 for the household members.

Five active cases of pulmonary tuberculosis found among the students would then amount to approximately $516 as the cost per case.

Two active cases of pulmonary tuberculosis found among the household members would amount to approximately $1200 as the cost per case.

A much fairer way to evaluate the cost of the Woodward High School survey would be to look upon it as an educational program in which 968 individuals were tuberculin tested, given a physical examination and x-rayed at a total cost of approximately $5000 or only $5.16 per case, and while doing this splendid piece of educa-

tional work there were found 5 cases of active pulmonary tuberculosis, 23 cases of active primary tuberculous infection, and 5 cases of healed pulmonary tuberculosis among the students; 2 cases of active pulmonary tuberculosis, 6 cases of active primary tuberculous infection, and 25 cases of healed pulmonary tuberculosis among the household members.

2) The majority of the students in this survey found with active pulmonary tuberculosis and active primary tuberculous infections came from the basin area of Cincinnati.

3) Positive reactions to P.P.D. No. 1 and No. 2 among the white students was 49.3 per cent; among the colored students 71.1 per cent. Generally speaking the Negroes showed more sensitivity to the tuberculin test than the whites, especially the P.P.D. No. 1 which was 20.2 per cent positive in the whites and 44.5 per cent positive in the Negroes.

Table No. 2 clearly demonstrates that a large number of the students have at some time been in contact with active tuberculosis.

4) The x-ray diagnosis reveals a relatively small percentage of negative chests (no calcifications) among both the white and Negro students, 11.78 per cent. In addition there was 1.0 per cent pulmonary tuberculosis, healed; 1.0 per cent pulmonary tuberculosis, active; 4.59 per cent primary infection, active; and 81.63 per cent primary infection, healed.

The high percentage of primary infection, healed, also is good evidence that a large number of students have at some time been exposed to active tuberculosis.

Table No. 3 shows the most significant finding of the whole survey—3.10 per cent active pulmonary tuberculosis found among the Negro students. Active pulmonary tuberculosis occurred 11.5 times as frequently among the Negro students as among the white students and active primary infection occurred 3.1 times as frequently among the Negro students as among the white students in this survey.

A yield this high of active pulmonary tuberculosis and active primary tuberculous infection cases in the eleventh grade Negro students of Woodward High School would warrant close supervision and a continuous case finding program.

5) The twenty-three students found with active primary infection were carefully studied and followed with the result that not one single case developed a reinfection type (adult type) of tuberculosis.

6) From this survey there appears to be no correlation between the presence of calcification in the lung fields or hilar nodes in a negative or a positive tuberculin test in the two larger groups of the negative and primary infection, healed. Table No. 4.

There were insufficient numbers in the healed pulmonary tuberculosis, active primary tuberculous infection and active pulmonary tuberculosis groups to draw any conclusions in regards to calcification and negative or positive tuberculin reactions.

7) Two known cases of active pulmonary tuberculosis found since the survey showed healed primary infections when the Woodward High School survey was made. From this one might conclude that healed primary infection does not afford any resistance or immunity to reinfection (adult type) tuberculosis.

8) Of the five cases of active pulmonary tuberculosis found among the students in the survey, only one was white and four were Negroes. The pulmonary tuberculosis was in a more advanced stage in the Negro students than in the white students.

9) Only a small number of total household members were studied, being 22.1 per cent among the whites and 29.1 per cent among the Negroes.

By comparing Table No. 5 with Table No. 3, one sees that the examination of the household members was not nearly as fruitful in finding active primary infection and active pulmonary tuberculosis cases, by about one-third the number, as was the survey among the students. However, as one would expect, the household members showed a much higher percentage of healed pulmonary tuberculosis due to the large number of adults.

10) Where repeated x-ray films were requested among the students and also the household members, a much higher percentage was taken within the specified time in the Negro group than was the case among the white group. This may indicate more cooperation on the part of the Negroes than among the whites in a public health survey or study.

11) The x-ray films of every case diagnosed as active primary infection and active pulmonary tuberculosis were carefully reviewed and studied by Dr. H. Kennon Dunham, Dr. Barbara A. Hewell and Dr. H. J. Nimitz, with complete agreement for the diagnosis to stand.

12) (a) X-ray examination alone of the 501 students would have found:

5 Cases—Pulmonary tuberculosis, healed
5 Cases—Pulmonary tuberculosis, active
23 Cases—Primary tuberculous infection, active
Educational value—fair

(b) Tuberculin tests of the 478 students with x-raying the 128 positive P.P.D. No. 1 would have found:
2 Cases—Pulmonary tuberculosis, healed
4 Cases—Pulmonary tuberculosis, active (all Negro)

7 Cases—Primary tuberculous infection, active

and missed:

3 Cases—Pulmonary tuberculosis, healed
1 Case —Pulmonary tuberculosis, active (white, minimal)
16 Cases—Primary tuberculous infection, active

X-raying the 264 positive P. P. D. No. 1 and 2 would have found:

2 Cases—Pulmonary tuberculosis, healed
4 Cases—Pulmonary tuberculosis, active
17 Cases—Primary tuberculous infection, active

and missed:

3 Cases—Pulmonary tuberculosis, healed
1 Case —Pulmonary tuberculosis, active
6 Cases—Primary tuberculous infection, active
Educational value—excellent

(c) Physical examination alone of the 501 students would have found:

3 Cases—Pulmonary tuberculosis, active (advanced)

and missed:

5 Cases—Pulmonary tuberculosis, healed
2 Cases—Pulmonary tuberculosis, active (minimal)
23 Cases—Primary tuberculous infection, active
Educational value—excellent

13) The educational value of the Woodward High School survey cannot be measured in dollars and cents. Such a program has a tremendous educational value which is bound to influence each and every one of the 501 students, their friends and relatives for an indefinite period of time. The same thing can be said for the 467 household members also examined in this survey.

The Woodward High School survey was a valuable and worthwhile project. It demonstrated the value of the x-ray, the tuberculin test and physical examination. It further demonstrated the comparative value of examining white and Negro students between the ages of 15 and 21 years and their respective household members in order to find active primary tuberculous infection and active pulmonary tuberculosis cases. It also demonstrated the difficulty and impossibility in getting all household members in for an examination as well as the difficulty of getting check-up films within the specified time.

With our present knowledge, the method of choice today for case finding surveys is the stereoscopic miniature 4x5-inch x-ray film. On all cases of questionable activity of either primary tuberculous

infection or pulmonary tuberculosis, the tuberculin test, a careful history, physical examination and sputum examination are all valuable diagnostic procedures which will determine the manner in which the cases should be handled.

Acknowledgement is given to Dr. Leo C. Wertheimer and Dr. Louis B. Owens who did the tuberculin testing and physical examinations; to Dr. H. Kennon Dunham, Dr. John H. Skavlem and Dr. David W. Heusinkveld for reading and interpreting all of the x-ray films; to the Cincinnati Board of Health for making it possible to have the x-ray films taken at the Health Center, and to Miss Sattler for taking the films; to the Board of Education for permission to conduct the survey at the Woodward High School; to the principal and faculty of the Woodward High School for their fine spirit of cooperation; to the Public Health Nurses and, especially to Miss Irene Haggerty for assisting with follow-up studies on students and household members; to Dr. Floyd Allen for his statistical analysis of the survey; to the staff of the Cincinnati Anti-Tuberculosis League, especially to Dr. R. G. DeVoist and Mrs. Blanche R. Miller for working out the details and conducting the educational program; and to the Christmas Seal Committee for financing the survey.

SUMMARY

The Woodward High School of Cincinnati, Ohio, was selected for this survey because: (1) It served the great majority of people in the lower economic group, especially from an area of the city where the incidence of tuberculosis was highest. (2) Approximately 50 per cent of its students were negroes.

The entire program consisted of tuberculin testing with P. P. D., physical examination and x-raying of 501 eleventh grade students, the majority of whom were between 16 and 18 years of age. There were 372 white and 129 negro students. A total of 467 members of the households of these students were also studied.

Five cases of active pulmonary tuberculosis (1.0%); 23 cases of active primary tuberculous infection (4.59%); and, 5 cases of healed pulmonary tuberculosis (1.0%) were found among the students.

Two cases of active pulmonary tuberculosis (0.43%); 6 cases of active primary tuberculous infection (1.28%); and, 25 cases of healed pulmonary tuberculosis (5.33%) were found among the household members.

CONCLUSIONS

1) Positive tuberculin reactions to P. P. D. No. 1 and No. 2 among white students was 49.3 per cent; among negro students 71.1 per cent. Generally speaking, the negroes showed more sensitivity to

the tuberculin test than the white students, especially to P. P. D. No. 1 which was 20.2 per cent positive in the whites and 44.5 per cent positive in the negro students.

2) The x-ray diagnosis revealed a relatively small percentage of negative chest (no calcification) among both the white and negro students:

11.78% Negative
1.00% Pulmonary tuberculosis, healed
1.00% Pulmonary tuberculosis, active
4.59% Primary infection, active
81.63% Primary infection, healed.

3) The most significant finding of the whole survey was the 3.10 per cent of active pulmonary tuberculosis found among the negro students, which was 11.5 times more frequent than among the white students (0.27%); and the 9.3 per cent active primary infection found among the negro students, which was 3.1 times more frequent than among the white students (3.0%).

4) The method of choice today for a case finding survey is the stereoscopic miniature 4x5-inch x-ray film. On all cases of questionable activity of either primary tuberculous infection or pulmonary tuberculosis, the tuberculin test, a careful history, physical examination and sputum examinations are all valuable diagnostic procedures which will determine the manner in which the cases should be handled.

RESUMEN

Se escogió a la Escuela Secundaria de Woodward de Cincinnati, Ohio, para este censo porque: (1) Los asistentes a este escuela procedían de la clase de recursos económicos más reducidos, especialmente de un barrio de la ciudad en el que se observaba la frecuencia más alta de la tuberculosis. (2) Aproximadamente un 50% de los alumnos eran de raza negra.

El plan entero consistió en la reacción a la tuberculina P. P. D. y el examen físico y roentgenográfico de 501 alumnos del undécimo grado, la mayor parte de los cuales se encontraban entre los 16 y los 18 años de edad. Había 372 estudiantes blancos y 129 de raza negra. Estudióse también a 467 miembros de los hogares de estos alumnos.

Entre los estudiantes se descubrió: 5 casos de tuberculosis pulmonar activa (1.0%); 23 casos de infección tuberculosa primaria activa (4.59%), y 5 casos de tuberculosis pulmonar cicatrizada (1.0%).

Entre los miembros de los hogares de los estudiantes se descubrió: 2 casos de tuberculosis pulmonar activa (0.43%); 6 casos de infección tuberculosa primaria activa (1.28%), y 25 casos de tuberculosis pulmonar cicatrizada (5.33%).

CONCLUSIONES

1) 49.3% de los alumnos de raza blanca y 71.1% de los de raza negra manifestaron una reacción positiva a la tuberculina P. P. D. No. 1 y No. 2. Generalmente, los negros manifestaron mayor sensibilidad a la tuberculina que los blancos, especialmente a la P. P. D. No. 1 que dio 20.2% de reacciones positivas entre los alumnos blancos y 44.5% entre los negros.

2) El diagnóstico roentgenológico reveló un porcentaje relativamente pequeño de Pulmones Normales (sin calcificación) tanto entre los alumnos blancos como entre los negros:

11.78% Normal
1.00% Tuberculosis pulmonar, cicatrizada
1.00% Tuberculosis pulmonar, activa
4.59% Infección primaria, activa
81.63% Infección primaria, cicatrizada.

3) El hallazgo más significativo de todo el censo fue el 3.10% de tuberculosis pulmonar activa que se descubrió entre los alumnos negros, una frecuencia 11.5 veces mayor que entre los alumnos blancos (0.27%); y el 9.3% de infección primaria activa que se descubrió entre los negros, una frecuencia 3.1 veces mayor que entre los blancos (3.0%).

4) El método de elección de hoy en el descubrimiento de casos es el uso de la película radiográfica estereoscópica de miniaturas de 4x5 pulgadas. En todo caso de infección tuberculosa primaria o de tuberculosis pulmonar en el que existe duda acerca de la presencia de actividad, la reacción a la tuberculina, la historia exacta, el examen físico y los exámenes del esputo son procedimientos valiosos en el diagnóstico que determinarán la manera como se ha de tratar estos casos.

"Information Please"

A Quiz on Diseases of the Chest*

DR. C. HOWARD MARCY, F.C.C.P., *Chairman*
Pittsburgh, Pennsylvania

Medicine—DR. GEORGE G. ORNSTEIN, F.C.C.P.
New York, New York

Surgery—DR. RICHARD H. OVERHOLT, F.C.C.P.
Brookline, Massachusetts

Pathology—DR. OSCAR AUERBACH
Staten Island, New York

Bronchoscopy—DR. PAUL H. HOLINGER, F.C.C.P.
Chicago, Illinois

To Dr. George G. Ornstein:

Question: How does one treat acute pneumonic tuberculosis? Does immediate pneumothorax have any place?

Answer: The treatment of acute pneumonic tuberculosis at its onset is by conservative rest therapy. Until the caseous areas liquify and break into the bronchial tree the best treatment is conservative rest therapy. As soon as there is definite evidence on physical and x-ray examination that cavitary formation has occurred, collapse therapy should be started. Once cavitary formation occurs there is little danger in pneumothorax therapy. The first x-ray appearance of cavitary formation suggests a moth-eaten appearance of consolidated lung tissue. This early cavitation, following softening and sloughing out of the caseous lung tissue, takes about six weeks.

Pneumothorax therapy in acute caseous pneumonic tuberculosis before the development of cavitary formation is very frequently complicated by spontaneous pneumothorax and tuberculous empyema. Since we have adopted the above indications for pneumothorax collapse therapy in acute caseous pneumonic tuberculosis at the Metropolitan and Sea View Hospitals, spontaneous pneumothorax and tuberculous empyema are infrequent complications.

Question: What can be done to prevent re-occurrences of a spontaneous pneumothorax of non-tuberculous nature? Blebs in the pleura?

Answer: The pathogenesis of spontaneous pneumothorax in healthy individuals is most intriguing. The disease usually occurs in healthy males. In a series of cases Dr. Lercher and I recently reported, we had 3 females and 55 males. Most of the group were young robust individuals as suggested by an average weight of 145 pounds. Then how is it that in a robust group of individuals we have the development of a spontaneous pneumothorax? Our concept of pathogenesis is as follows:

First, pathologists and anatomists have referred to the frequency of finding emphysematous blebs in the apices and anterior margins of the upper lobes of the lungs. S. W. Miller has demonstrated that the elastic

*Presented at the Eighth Annual Meeting of the American College of Chest Physicians, Atlantic City, New Jersey, June 6, 1942.

fibers in the walls of the sub pleural layer of alveoli anastomose with the elastic fibers of the aveolar and elastic layers of the overlying visceral pleura. Miller pointed out when the subpleural alveoli are overdistended the elastic fibers in the alveolar wall are stretched until the breaking point and finally rupture. Air then escapes from the alveolus and separates the aveolar layer of the pleura from the underlying alveoli. In this manner a pleural bleb or cyst is formed.

Question: Why does this occur chiefly in the robust male adult?

Answer: We are all familiar with the overdistention of apices of the lungs following cough. This phenomenon can be visualized during fluoroscopy. A similar phenomenon occurs on severe exertion. During severe exertion a deep inspiration is made and the glottis is closed. During the exertion the expiratory and abdominal muscles are contracted. Air from the lower lobes is forced into the upper lobes and thus overdistends the upper lobes. The phenomenon can be demonstrated very nicely by x-raying the subject in deep inspiration and again without expelling any air, closing the glottis and contracting the expiratory and abdominal muscles. With the tugging, wrestling, pulling, and pushing in the early youth, the development of emphysematous blebs is very probable.

Some investigators believe that the first cause must be disease in the lung which weakens the lung tissue. Emphysematous blebs may occur in weakened lung tissue, but occur more frequently in healthy lung tissue.

Hayashi and Fisher in their limited experience believed the weakening was due to tuberculous disease. The above impression has been proven wrong. First, at the age of the occurrence of spontaneous pneumothorax, tuberculosis is more rife in females than in males, and still the disease is very infrequent in females compared to males. Secondly, because of the delay in the development of the primary tuberculous infection, we have tuberculin tested a number of our cases and found them to be negative tuberculin reactors.

The overdistention of the subpleural alveoli can produce pleural blebs in normal or weakened lung tissue.

The presence of the bleb itself will not produce spontaneous pneumothorax. The bleb must become ball-valved following which it distends until its walls are so thinned out, and finally ruptures. Therefore, in pathogenesis there must be first, the formation of the bleb, the ball valve phenomenon, and finally, the rupture.

Because emphysematous blebs are usually multiple in number and occur in both lungs, recurrences are not infrequent. In our series, there were recurrences in 29 per cent of the cases.

Recovery following the first attack is rapid and usually takes from four to six weeks. The treatment is simple: If the pneumothorax is small, simple rest is sufficient to re-expand the lung. If the pneumothorax is large, removal of air from the pleural cavity shortens the period in bed.

If in the re-expansion of the lung the pleural cavity is obliterated, there will be no more attacks in that lung. Attacks, however, may occur in the opposite lung. The question of using sclerosing materials to produce an obliteration of the pleural cavity has been brought up for discussion.

I have never made use of it because the attacks, no matter how many times they occur, take so little out of the patient that I have never attempted to artificially obliterate the pleural cavity.

Question: Has anyone found a satisfactory medical treatment for pure tuberculous empyema?

Answer: Though there are many definitions of tuberculous empyema, I assume the question relates to a purulent pleural fluid containing tubercle bacilli, and no other organisms.

The management of tuberculous empyema depends on a number of factors. The most important is the underlying pulmonary tuberculosis. If the lung tuberculosis is controlled, the prognosis is much more favorable than when the pulmonary disease is uncontrolled. Thus, in a tuberculous empyema where the underlying pulmonary tuberculosis is quiescent, the purulent fluid may be removed and the lung allowed to partly re-expand. The expanded portion of the lung will in itself then be able to reabsorb any new increase in pleural fluid. At times the purulent fluid may be very thick and aspiration is difficult. At Sea View Hospital we have made use of a wetting and bactericidal agent, introduced by Dr. Petroff, which thins out the thick fluid so that it may be aspirated easily. This wetting bactericidal combination also has a definite influence on the growth of the tubercle bacilli. When we are of the opinion that the underlying lung tuberculosis is arrested and the lung could be expanded, we combine with aspiration and Petroff's wetting agent, a number of oxygen lavages of the pleural cavity. The oxygen lavage in a lung that can expand, facilitates a rapid expansion of the lung and an obliteration of the pleural cavity.

Where the lung can only partly re-expand, and when the fluid thins out and contains few tubercle bacilli, we allow the fluid to encapsulate and fill up the deal pleural space. Few of the encapsulations will have any further complications.

On the other hand, when the underlying disease is not controlled, the purulent pleural fluid is aspirated and the lung is re-expanded if possible, in the manner we have just previously discussed. Should the lung not expand or expand fully, I recommend a thoracotomy followed immediately by a thoracoplasty and Shedde operation.

Where there is a permanent broncho-pulmonary fistula, whether the underlying lung is controlled or not, I recommend the above surgical procedure.

Furthermore, remember the prognosis is in direct relationship to underlying pulmonary tuberculosis.

Question: How frequently do you recognize atelectasis as a complication of pneumothorax therapy and if so, how does it affect your treatment?

Answer: The involved lobe of the lung very frequently is atelectatic from the start of pneumothorax therapy. We must keep in mind that the area of diseased lung is airless and that the area of the lobe involved is smaller than its normal size. This accounts for the selective pneumothorax. With an increase in the volume of the pneumothorax the whole lobe may become atelectatic which is just what we desire. We should try to keep the diseased areas of lung collapsed, and the normal lung tissues well expanded.

Occasionally soon after the induction of pneumothorax, the whole lung becomes atelectatic. I always become suspicious of an endobronchial tuberculosis with some stenosis of the major bronchi. I maintain the pneumothorax and give small amounts of air so that the good parts of the lung will re-expand.

Question: Are the "sulpha" drugs of value in treatment of lung abscess?

Answer: I believe the use of "sulpha" drugs are of great value in the early phase of lung abscess. I have been seeing fewer cases of lung abscess

since the free use of sulphonamides. Apparently the abscess is treated in its early phase as a pneumonia and the patients are fortunate to have the best therapy in the early phase of the disease. I am also of the opinion that most lung abscesses are due to faculatative aerobes of which streptococci and staphylococci are the most frequent organisms entrapped. It has still not been definitely proven that the spirochettes, vibrii, fusiform bacilli are the offenders and are not present as secondary invaders.

Should the abscess not rapidly respond to the sulpha drugs, I would advise surgery.

Question: How do you feel regarding instituting collapse therapy in a newly admitted patient who is definitely toxic?

Answer: The toxicity is no contraindication against pneumothorax. The time when to begin collapse in an acute caseous pneumonic pulmonary tuberculis has been previously discussed.

Dr. Richard H. Overholt:

Question: Discuss briefly your management of so-called giant cavities.

Answer: Giant cavities are extremely difficult to control by any method of surgical collapse. In many giant cavities, there is a check-valve mechanism in the communicating bronchus. If such a mechanism can be demonstarted or if it is suspected, a failure of primary collapse treatment can be predicted. Assuming that the patient has enough residual healthy lung to justify surgical attempts to control the disease, preliminary cavity drainage is usually advised. We have abandoned the Monaldi type of drainage for three reasons:

1) The uncertainty of the condition of the pleura which goes with blind introduction of a trocar and cannula.

2) The drainage tract usually traversed and therefore damages some healthy lung.

3) The technical difficulties of keeping the tube in place. A safer and more positive type of drainage for the cavity can be provided by open cavernostomy. For upper lobe lesions a rib is resected in the axilla. The cavity is then opened and packed under direct vision. Dusting the cavity walls and wound with a sulfa drug maintains a clean field: within a short time the wound closes down and a mushroom catheter is left to maintain a drainage tract that can be conveniently managed indefinitely. A posterior one or two stage thoracoplasty is performed and then an anterior thoracoplasty soon after the drainage is instituted.

The time will come when certain giant cavities (those existing in the presence of a sound contralateral lung) will be handled by primary resection—either segmental lobectomy, lobectomy or pneumonectomy. The final thoracoplasty will then be done after the pathological lung has been excised.

Question: What are the indications for pneumonectomy in tuberculosis?

Answer: The indications which we believe call for the total removal of a lung in tuberculosis are chiefly found in two groups of cases:

1) Those where parenchymal disease is complicated by bronchial tuberculosis, and

2) When the tuberculous disease is associated with another process such as bronchiectasis, multiple abscess or tumor. Most of the total resections which have been performed have been for complicating bronchostenosis, the lesion in the bronchus being either an active or an inactive tuberculous one. Those patients with this distressing complication who have

been selected for pneumonectomy fall into the following groups:

1) Active lesion in the bronchus and corresponding lobes.
2) Inactive lesion in the bronchus with
   a) uncontrollable cavity (pneumothorax or thoracoplasty failures)
   b) extensive parenchymal process obviously impossible to expect successful collapse (check-valve cavity).
   c) unexpandible lung and re-appearance of bacilli or symptoms after prolonged pneumonthorax.

It goes without saying that total resection is not available to patients with a demonstrable active process in the contralateral lung. It might also be emphasized that the extent of the resection is determined by the extent of the disease. Unilobar involvement calls for lobectomy. Certain segments of lobes, if individually involved, may be individually resected. Early in our experience with the resection of tuberculous lungs, the operation was done in post-thoracoplasty cases. In these patients there had been a failure to control a tuberculous lesion or it was discovered that suppurative bronchiectasis co-existed. Our current opinion is that if resection is ultimately going to be necessary, it is best performed as a primary surgical step. As soon as the bronchus is ligated and the operation completed, the danger of bronchiogenic spread is largely removed. The adjustment of the thoracic wall (thoracoplasty) can then be carried out more effectively and more safely as a final step.

Question: Discuss management of operated chronic lung abscess, draining for one year or more with markedly adherent lung.

Answer: A chronic lung abscess with failure to heal after external drainage usually means one of two things—either a large broncho-pleurocutaneous fistula or the suppurative process has resulted in irreparable damage to a segment, lobe or the entire lung with secondary abscesses or bronchiectasis. In both instances bronchograms are indicated. If it is demonstrated that the adjacent lung tissue is sound and one is dealing with merely a fistula, this can be closed by a muscle graft. In many of the chronic abscess cases, bronchiectasis, multiple abscesses or fibrotic lobes will be found and these are best treated by resection. The extent of the resection depends upon the extent of the disease found.

Question: Is extrapleural pneumothorax an advisable procedure in certain cases?

Answer: Extrapleural pneumothorax still retains a place in the armamentarium of the thoracic surgeon, but this place is extremely limited. Usually patients with cavitated lungs who need surgical help require a permanent form of collapse. This had best be effected by moving the chest wall down with the lung and without the creation of an artificial space which requires maintenance for indefinite periods. However, there are certain patients with bilateral lesions, one side of which can be or has been controlled by thoracoplasty, and it is found that intrapleural pneumorthorax is impossible on the better side. Here an extrapleural pneumothorax may be the procedure of choice in preference to bilateral thoracoplasty. For certain lesions in adolescent patients extrapleural pneumothorax may be considered as a substitute for an intrapleural pneumothorax if such a procedure is impossible or is not satisfactory.

Question: What safeguards are necessary to insure a safe pneumonolysis operation for the patient with bilateral pneumothorax, and low vital capacity?

Answer: It is our practice always to have some one on hand to admin-

ister oxygen with a mask in a closed circuit in the event that pneumonolysis is performed in the presenve of bilateral pneumothorax. If the entrance of air incident to the instrumentation embarrasses the patient's breathing, positive pressure oxygen will give immediate relief and permit one to continue the operation. It is important that preliminary sedation be adequate and that the operation be done without the slightest discomfort to the paitent. Excessive chest motion is fostered by a painful procedure and this adds to the dypnoea. Careful local infiltration at the site for insertion of the trocar and also of the base of adhesion is important.

It should be stated, however, that more patients get into trouble during the course of a pneumonolysis operation because of the selection of patients unsuitable for the procedure rather than from difficulty with the management of pressure relationships during the course of the procedure.

Dr. Oscar Auerbach:

Question: Does the thickness of the wall of the cavity bear any relation to the age of the cavity?

Answer: Generally speaking, yes. The thickness of the cavity wall indicates its age in this respect: As the cavity grows older the outer wall is formed by connective tissue which develops from the organization of the perifocal inflammation in the alveolar spaces. As the cavity develops the outer wall becomes correspondingly wider from the continuous conversion of the zone of perifocal inflammation into one of connective tissue. In the majority of cases we find that the older the cavity the thicker is the outer wall of fibrous tissue.

Question: What are the causes of pleural fluid?

Answer: We are of the impression that the fluid which develops in the pleural cavity of individuals with chronic pulmonary tuberculosis is of two types. Both occur in the presence of an artificial pneumothorax. Under ordinary circumstances the tuberculous focus which subsequently develops into a cavity results in a development of a perifocal inflammation. This perifocal inflammation is also manifested in the pleural cavity when the pulmonary lesion lies near the pleura. The perifocal reaction in the pleural space is manifested by the exuding of fluid into the pleural cavity. This pleural fluid becomes organized into connective tissue and accounts for frequently adhesions of the of the leaves of the pleura overlying a tuberculous cavity. If one collapses the lung while the pleural fluid has not yet been organized, this fluid then accumulates within the pneumothorax space. The fluid is usually clear and of light yellow color.

The conditions are entirely different when a spontaneous pneumothorax develops after an artificial pneumothorax. In these cases the pleural exudate develops from the perforation of a liquified caseous focus in the subpleural aspect of the lung. The fluid here is cloudy at first and later becomes purulent.

Question: Can tuberculosis have any importance in the development of bronchogenic carcinoma?

Answer: In those cases in which carcinoma is present in one portion of the lung parenchyma and tuberculosis in another we feel that both conditions are completely unassociated. We observed 20 cases of carcinoma and pulmonary tuberculosis in the lungs of the same individuals. In only six of the 20 cases were they both present in the same lung. In none of these cases were we convinced that the carcinoma arose from the pulmonary tuberculosis. The carcinomatous process was present for a long time while the pulmonary tuberculosis was active and occurred after the

carcinoma. It has been our experience that carcinoma of the lung does not arise on the basis of an old chronic pulmonary tuberculosis.

Question: What is the etiology of tuberculous endobronchitis?

Answer: To answer this question one must divide it into two parts. One, a tuberculous endobronchitis which develops in the region of the pulmonary cavity and two, tuberculosis in the major bronchi. Both are the result of an underlying tuberculous lesion in the pulmonary parenchyma.

1) It has been our experience that the bronchi in the region of a tuberculous excavation are involved in almost every instance. The extent of the involvement varies. In most instances the tuberculous ulcerations of the bronchus are limited to the immediate vicinity of the cavity. In some intsances the tuberculous ulceration extends toward the hilus for a great distance. This usually occurs in the very extensive and progressive tuberculous excavation.

2) Tuberculosis of the trachea and major bronchi is secondary to chronic pulmonary tuberculosis. Usually the extent of the involvement of the air passages increased with the extent of the underlying pulmonary tuberculosis. We have never been convinced that a tuberculous cavity in the lung develops secondary to a tuberculous process in the trachea and major bronchi.

Dr. Paul H. Holinger:

Question: What interval, if any, should elapse between a hemoptysis due to a tuberculous lesion in the lung, and bronchoscopy?

Answer: The interval of time depends on the degree of hemoptysis and on the indication for the bronchoscopy. Following gross pulmonary hemorrhage, one would want to wait a month or six weeks, unless a bronchial obstruction or another similar indication for bronchoscopy presented itself. On the other hand, if bronchial tuberculosis were suspected and a very slight hemoptysis occurred, one might wish to make a bronchoscopic examination immediately in order to trace the blood to its source.

Question: Indications for treatment (bronchoscopy) of post-operative atelectasis. (1) Diagnosis; (2) Treatment; (3) Anesthesia for bronchoscopy.

Answer: The diagnosis of post-operative atelectasis may be made when a patient has respiratory distress beginning within 24 hours after surgery, which is associated with pain in the chest, and cough. The physical and roentgen findings include dullness over one lobe or an entire lung, elevation of the diaphragm or the affected side, rales or rhonchi, and a shift of the heart and mediastinum toward the affected side. A rise in temperature, the pulse rate and the respiratory rate accompanies the findings.

Treatment consists of efforts to increase the depth of respiration through the use of CO_2 inhalation, rotations of the patient from side to side, and attempts to make the patient cough. If the conservative measures do not result in clearing the bronchi of obstructing secretions, bronchoscopic aspiration through a bronchoscope or by means of an intratracheal catheter must be done promptly. A patient who is acutely dyspnic or even cyanotic, requires immediate bronchoscopic aspiration.

The anesthesia for bronchoscopy in post-operative atelectasis is usually a local one, pontocaine or cocaine. In children the procedure may be done without anesthesia. If the patient is comatose, anesthesia is likewise unnecessary.

NORMAN THOMAS KIRK

Major General, U. S. Army, The Surgeon General

NORMAN THOMAS KIRK

On May 28, 1943, the United States Senate confirmed the President's nomination of Norman Thomas Kirk to be The Surgeon General, U. S. Army, with the rank of major general, for a period of four years from date of acceptance. General Kirk accepted on June 1, 1943.

General Kirk was born on January 3, 1888, in Rising Sun, Maryland. He was graduated from Tome School, Port Deposit, Maryland, in 1906, and received the M.D. degree from the University of Maryland in 1910. He served as resident physician at the University Hospital, Baltimore, and as clinical assistant at the United States Soldiers' Home Hospital, Washington, D. C., before being commissioned as first liteutenant in the Medical Reserve Corps on May 29, 1912.

His first service was at the Soldiers' Home, Washington, D. C., in June 1912. The following September he enrolled in the Army Medical School, Washington, D. C., and following graduation was stationed at Field Hospital No. 3, Texas City, Texas, from June 1913 to July 1915. For seven months of this period Field Hospital No. 3 was stationed at Vera Cruz, Mexico, as part of the Punitive Expedition.

That same month he went to Fort Grant, Panama Canal Zone, for a brief tour of duty after which he was transferred to Fort Sherman, Panama Canal Zone, in October 1915. He returned to the United States for duty at the Base Hospital, Brownsville, Texas, in July 1916.

In September 1917 he was assigned to Camp Greenleaf, Georgia, serving there until January 1919, when he was ordered to Walter Reed General Hospital, Washington, D. C., for surgical service. After brief tours of duty in several hospitals on the mainland he was transferred to the Sternberg General Hospital, Manila, Philippine Islands, as Chief of Surgical Service.

Returning to the United States in July 1930, he was assigned to Walter Reed General Hospital, Washington, D. C., as Chief of the Orthopedic Section. He entered the Medical Field Service School, Carlisle Barracks, Pennsylvania, in October 1931, and following his graduation from the Advanced Course returned to his duties at the Walter Reed General Hospital.

General Kirk became Chief of Surgical Service, Station Hospital, Fort Mills, Philippine Islands, July 1934, and in February 1935 became Chief of the Surgical Service, Sternberg General Hospital, Philippine Islands.

Upon returning to the United States in July 1936, he became Chief of Surgical Service, Letterman General Hospital, San Francisco, California, serving in that capacity until January 1941 when he returned to Walter Reed General Hospital, Army Medical Center, Washington, D. C., as Chief of Surgical Service. In July 1942 he was named Commanding Officer, Percy Jones General Hospital at Battle Creek, Michigan.

Promotions in the service brought General Kirk the rank of captain on June 7, 1916, and major on May 15, 1917. On November 6, 1918, he was commissioned lieutenant colonel in the National Army, which rank he held until February 14, 1920. He was commissioned lieutenant colonel in the Regular Army on May 22, 1933, colonel on May 22, 1939, and on March 12, 1943, he was promoted to the temporary rank of brigadier general in the Army of the United States.

General Kirk is recognized as a general surgeon of extremely high capacity, being particularly well known for his work on bone and joint surgery. His volume on *Amputations: operative technique*, which appeared in 1924 and which was the result of large experience following World War I, is still a standard textbook. In addition to this book he has written a great many other articles on clinical and operative surgery.

General Kirk has been honored by membership in the most selective surgical societies of the United States, including the American Surgical Association which limits its active membership to 150. He is a member and governor of the American College of Surgeons, and member of the American Medical Association, the American Orthopedic Association, the American Association for the Surgery of Trauma, the American Academy of Orthopedic Surgeons, and Diplomate of the American Board of Surgery.

A dynamic personality, forceful and aggressive, his surgical skill is paralleled by his surgical judgment. He is looked upon as a man of sound and mature judgment which is based upon experience and which is always tempered with conservatism.

General and Mrs. Kirk have two daughters, Ann and Jane.

EDITORIAL

VITAMINS

The advertising of Vitamins by radio and press has increased until the listening and reading public is subjected to a veritable bombardment of propaganda for one brand or another. Vitamins are definite therapeutic agents. That the public is unfamiliar with their specific indications and optimum dosage hardly needs to be emphasized. That the commercial advertisers are more interested in making sales than in fitting the remedy to the malady hardly needs to be questioned.

We believe that if the physician is to keep faith with his patients, it is his duty to determine as far as possible the exact qualitative and quantitative requirement of Vitamins in the particular case; to acquaint himself with the formulas and potency of the various products available; and to dignify his recognition of the patient's requirement by writing a prescription. Clinical and experimental research on Vitamins has been extensive, and information concerning the therapeutic value of and the indications for every known Vitamin factor is readily available in medical literature. Reliable pharmaceutical manufacturers will furnish to physicians accurate information concerning their products.

Simply to prescribe Vitamins without specifying component factors or dosage, or to prescribe a certain brand of one or more Vitamins without first determining that its formula is optimum for the patient and telling him that this and no other will meet his requirement, fails to impress upon him the fact that Vitamins are not all alike, not a cure-all, and that only the physician is qualified to prescribe for him.

Leaving the choice of the Vitamin product to the druggist or to the patient encourages the indiscriminate purchase and use of these valuable therapeutic agents. Indolence in the practice of therapeutics encourages the spurious commercial propaganda which already amounts to a money-making racket in the sale of Vitamins. Let us put an end to our indolence and to the Vitamin racket!

R. C. M.

COLLEGE NEWS

BOARD OF EXAMINERS

The Board of Examiners of the College prepared and conducted a written examination for candidates for Fellowship in the College, throughout the country on January 29. Five questions were prepared for each of the following subjects: physiology, pathology, bacteriology, thoracic surgery, and pulmonary diseases. Candidates were required to answer three questions out of each set of five questions, or a total of 15 questions for the five subjects covered in the examination.

To eliminate unnecessary travel, it was decided that the examinations be conducted by an official of the College in the state nearest the applicant. Of the 20 candidates for Fellowship in the College who took the examination, the following 16 passed and were admitted as Fellows of the College:

Dr. Antonio A. Adames, Monrovia, California
Dr. Charles P. Bailey, Glenside, Pennsylvania
Dr. Richard A. Benkendorf, Bushnell, Illinois
Dr. Florence Brown, Portland, Oregon
Dr. Giovanni Capobianco, Providence, Rhode Island
Dr. Charles Farrell, Covington, Kentucky
Dr. Jack J. Goliger, Brooklyn, New York
Dr. Joseph Grund, Liberty, New York
Dr. George H. Jurgens, Wauwatosa, Wisconsin
Dr. Heinz Lorge, Rutland, Massachusetts
Dr. Gabriel Nadeau, Rutland, Massachusetts
Dr. Thomas J. Ormsby, Newark, New Jersey
Dr. Horacio E. Perez, Valhalla, New York
Dr. W. W. Pyle, Franklin, Tennessee
Dr. Joseph L. Robinson, Olive View, California
Dr. Emanuel Schwartz, Brooklyn, New York

The Board of Examiners wishes to express its appreciation to the officers of the College who conducted the examinations, as well as to the Executive Secretary and the office staff of the College for their fine cooperation in handling the details connected with the conduct of these examinations.

BOARD OF EXAMINERS

Dr. George G. Ornstein, F.C.C.P., New York, N. Y.
Chairman

Dr. Ralph C. Matson, F.C.C.P., Portland, Oregon

Dr. Jay A. Myers, F.C.C.P., Minneapolis, Minn.

COLLEGE INVITED TO MEET WITH SOUTHERN MEDICAL ASSOCIATION

Southern Chapter to Be Organized

At the invitation of the Southern Medical Association, plans have been completed for the College to participate in the next annual meeting of the Southern Medical Association, to be held at Cincinnati, Ohio, November 16-18, 1943. A program on chest diseases is being prepared by the Scientific Program Committee of the College and timely papers concerning this specialty will be presented at the meeting.

A Southern Chapter of the College, comprising the 16 states and the District of Columbia which affiliate with the Southern Medical Association, will be organized at Cincinnati on November 17. This Chapter will meet jointly with the Southern Medican Association each year.

The Ohio Chapter of the College will be the hosts to the members of the College and committees are now being set up to assist in the arrangements for the meeting. The members of the committees and the scientific program to be presented by the College will be published in a future issue of the journal. For further particulars concerning the meeting, write to the Executive Offices of the College, Chicago 10, Illinois.

CHAPTER MEETINGS

New England States Chapter

The New England States Chapter of the College held its annual meeting at the Harvard Club, Boston, Massachusetts, May 25, 1943. After the dinner, a business meeting was held. The following officers were elected for the coming year:

Dr. Richard H. Overholt, F.C.C.P., Brookline, Mass., President

Dr. U. E. Zambarano, F.C.C.P., Wallum Lake, R. I., Vice President

Dr. John Andosca, F.C.C.P., Mattapan, Mass., Secretary-Treasurer

Dr. J. Winthrop Peabody, F.C.C.P., Washington, D. C., President of the College, gave an address on the activities of the College. Dr. Arthur Q. Penta, F.C.C.P., Schenectady, New York, President of the New York State Chapter, spoke about the activities of the College in New York State. Dr. Woo of the Union Medical College, Peiping, China, spoke briefly of the proposed tuberculosis program in China. A Symposium on Tracheo-Bronchial Tuberculosis was presented, with Dr. Moses J. Stone, F.C.C.P., Boston, discussing the medical aspects; Dr. Norman J. Wilson, Brookline, the bronchoscopic aspects; Dr. William Meisner, New York City, the pathological aspects; and Dr. Richard H. Overholt, F.C.C.P., Brookline, the surgical picture. A general discussion followed.

New Jersey Chapter

The annual meeting of the New Jersey Chapter of the College was held at Newark, New Jersey, May 26, 1943. The following officers were elected for the coming year.

Dr. Clyde M. Fish, F.C.C.P., Pleasantville, President

Dr. Stephen A. Douglas, F.C.C.P., Paterson, Vice President

Dr. Irving Willner, F.C.C.P., Newark, Secretary-Treasurer (re-elected)

Dr. Joseph R. Morrow, F.C.C.P., Ridgewood, the retiring President, gave a resume of the activities of the Chapter for the past year and Dr. Irving Willner, F.C.C.P., Secretary-Treasurer, read the annual report. The following scientific program was presented:

"Congenital Cystic Lung," Dr. M. James Fine, F.C.C.P., Newark.

Discussion: Dr. J. R. Herradora, F.C.C.P., Jersey City; Dr. Richard Dieffenbach, Newark; Lt. Col. Henry A. Brodkin, Fort Dix; Dr. C. B. Henle, Newark.

"A New Approach in Therapy of Pulmonary Cavities," Dr. Anthony D. Crecca, F.C.C.P., Verona.

Discussion: Dr. Richard Dieffenbach, Newark; Dr. W. L. Weintraub, F.C.C.P., Paterson; Lt. Col. Henry A. Brodkin, Fort Dix.

The scientific papers were followed by an x-ray symposium conducted by Dr. William A. Wakeley, F.C.C.P., East Orange. Many interesting and unusual plates were examined and discussed. The meeting attracted the largest attendance of any of the meetings of the New Jersey Chapter of the College held to date. A large number of physicians invited as guests, as well as the nurses of the tuberculosis division of the Newark Board of Health attended the meeting. Among the invited guests were: Lt. Col. Henry A. Brodkin, Fort Dix; Dr. C. B. Henle; Dr. S. B. Meisel; Dr. Alan J. Stolon; Dr. Aaron Haskins; Dr. P. F. Coleman; Dr. Hymen Friedman; Dr. G. H. McKeown; Dr. Meyer Jedel; Dr. William P. Burgess; Dr. Richard Dieffenbach; Dr. T. Schiffman; Dr. Thomas Bell; and Dr. Nicholas Pollis.

Texas Chapter

The Texas Chapter of the College held its annual meeting at the State Sanatorium, Sanatorium, Texas, on May 9. The following officers were elected for the coming year:

Dr. Alvis E. Greer, F.C.C.P., Houston, President

Dr. Sam E. Thompson, F.C.C.P., Kerrville, Vice President

Dr. Robert G. McCorkle, F.C.C.P., San Antonio, Second Vice President

Dr. Charles J. Koerth, F.C.C.P., San Antonio, Secretary-Treasurer

The program presented at the meeting was published in the May-June issue of the journal. The members of the College were guests of Dr. J. B. McKnight, Medical Director and Superintendent of the State Sanatorium and the retiring President of the Chapter. The members and guests attended a luncheon given in their honor by Dr. McKnight and the medical staff of the sanatorium. In addition to the members of the College in Texas, the following guests attended the meeting: Dr. H. M. Anderson, San Angelo; Lt. C. L. Livingston, Goodfellow Field, San Angelo; Dr. Earle D. Sellers, Abilene; Dr. J. E. Johnson, Mineral Wells; Lt. H. M. Snodgrass, Concho Field, San Angelo; Maj. Joe Gilbert, Concho Field, San Angelo; Lt. J. C. Barnett, U. S. Navy; Capt. E. Levine, Fort Bliss; Dr. J. B. Barnett, Marlin; Dr. H. C. Samuel; Dr. W. C. Brown; Dr. T. S. Howell; Dr. G. W. Post; Dr. W. C. Hixson, and Dr. R. C. Bernard, Sanatorium, Texas.

Illinois Chapter

The Illinois Chapter of the College held its annual meeting at the Municipal Tuberculosis Sanitarium, Chicago, May 18. The following officers were elected for the coming year:

Dr. Minas Joannides, F.C.C.P., Chicago, President
Dr. Fred M. F. Meixner, F.C.C.P., Peoria, Vice President
Dr. Julius B. Novak, F.C.C.P., Chicago, Secretary-Treasurer

The following resolution was introduced at the meeting:

"BE IT RESOLVED: That the five immediate past Presidents of the Chapters constitute an Executive Committee of the Chapter.

"BE IT FURTHER RESOLVED: That the duties of the Executive Committee be as follows: To assist the present officers in conducting the affairs of the Chapter and to pass upon matters of a controversial nature coming before the Chapters which have not been heretofore provided for in the By-Laws."

This resolution will be presented at the next meeting of the Board of Regents of the College for discussion. Following the business meeting, a scientific program was presented as published in the May-June issue of the journal. All of the members of the College were guests of the Municipal Tuberculosis Sanitarium for dinner. Dr. Frederick Tice, Chairman of the Board of Directors of the Municipal Sanitarium, presided at the dinner and he made a brief talk outlining and commenting on the present activities of the sanitarium. Dr. Jas. H. Stygall, F.C.C.P., Indianapolis, Regent of the College for the District, gave a report of College progress. Dr. Andrew L. Banyai, Wisconsin, Regent of District No. 9, attended the meeting.

California Chapter

At a business meeting of the California Chapter held in May in connection with the annual meeting of the California Medical Association, the following officers were elected for the coming year:

Dr. Stephen A. Parowski, F.C.C.P., San Diego, President
Dr. Charles L. Ianne, F.C.C.P., San Jose, Vice President
Dr. J. J. Singer, F.C.C.P., Los Angeles, Secretary-Treasurer

New York State Chapter

The New York State Chapter of the College held its annual meeting at Buffalo on May 5. The following officers were elected for the coming year:

Dr. Arthur Q. Penta, F.C.C.P., Schenectady, President
Dr. James H. Donnelly, F.C.C.P., Buffalo, Vice President
Dr. Lyman I. Thayer, F.C.C.P., Glens Falls, Secretary-Treasurer (re-elected)

The Chapter plans on holding a meeting in New York City this Fall.

Cuban Chapter

At a meeting held at the Instituto de Vias Respiratorias, on April 15, the following program was presented:

"My Experience with the Photo-Fluorographic Method of Abreu," Dr. Frank W. Burge, F.C.C.P., Philadelphia, Pa.

"Outstanding Aspects of the Campaign Against Tuberculosis in the U. S. A.," Dr. Martinez Fortun, Havana.

"A New System for Stetho-acoustic Sign Recording," Dr. Antonio Navarrete, F.C.C.P., Havana.

"The System for Sign Recording in Use at the Instituto de Vias Respiratorias," Dr. A. Antonetti, F.C.C.P., Havana.

A joint meeting of the Cuban Chapter of the College and the National Society of Surgery of Cuba met in May in the auditorium of the Calixto Garcia Hospital, Havana. Dr. Alberto Inclan, President of the Sociedad Nacional de Cirugia, and Dr. Alfredo Antonetti, F.C.C.P., President of the Cuban Chapter of the American College of Chest Physicians, presided, with Dr. Pedro Pablo Nobo acting as Secretary. The following scientific program was presented:

"Economical War Surgery," Drs. Ricardo Machin and Alejandro Debeche, Havana.

"Esophago-gastrectomy for Cardial Neoplasm," Dr. Pedro P. Nobo, Havana.

"Treatment of Pulmonary Suppurations by Bronchoscopic Instillation of Sulphamids," Dr. Rufino Moreno, Havana.

"Lobectomy for Chronic Suppurative Lesions of the Lung—Presentation of Cases," Dr. Antonio Rodriguez Diaz, Havana.

Puerto Rico Chapter

An extraordinary session of the Chapter of Puerto Rico of the College was held at Santurce, March 28, 1943. The meeting was called to order by Dr. David Garcia, President, who stated that the purpose of the meeting was to discuss the recent changes in the anti-tuberculosis program of the Department of Health of Puerto Rico in an endeavor to make suggestions for the intensification of the present program and for the improvement of the working conditions of the specialists in tuberculosis.

It was unanimously approved to express to Dr. J. Rodriguez Pastor, deepest regret for his resignation as Chief of the Bureau of Tuberculosis of the Department of Health of Puerto Rico. Dr. Rodriguez Pastor has been the Chief of this Bureau since its foundation. He has been a pioneer in the anti-tuberculosis program in Puerto Rico and the success of the program has been due to his untiring devotion to this activity. Dr. Rodriguez Pastor has resigned effective April 1, 1943, planning to devote all his time to private practice.

The tuberculosis program of Puerto Rico was discussed extensively by Drs. Franco, Rodriguez Pastor, R. Velazquez, Guzman Rodriguez, Soto Ramos, Marrero, Acosta Velarde, M. Santiago and A. M. Marchand.

It was unanimously approved to have the president of the chapter name a committee with ample powers to discuss with the Hon. Commission of Health any and all points which in the opinion of the members of the committee might harm the interests of the anti-tuberculosis campaign or of the physicians working with this project.

The president of the Chapter named a committee consisting of: Drs. Rodriguez Pastor, Guzman Rodriguez, M. Santiago, R. Velazquez, and A. M. Marchand. It was unanimously approved to have Dr. D. Garcia form part of this committee.

COUNCIL ON PAN AMERICAN AFFAIRS

Postgraduate Sessions in Argentina

The twelfth postgraduate medical education course will be conducted at the University of Cordoba, Argentina, during the month of July, 1943, under the direction of Professor Dr. Gumersindo Sayago, F.C.C.P., Director of the "Instituto de Tisiologia" of the University of Cordoba. Dr. Sayago will be assisted by the professors of the Faculty of Medicine of the University of Buenos Aires and by professors from Rosario as well as by his associates of the service of the "Hospital y Dispensario T. C. de Allende." Physicians from most of the Latin American countries will attend the sessions.

Applications for membership in the College have been received from the following physicians in the Pan American countries:

Argentina

Buenos Aires
Dr. Susana F. Bavio
Dr. Alvaro E. Bence
Dr. Jose Maria Leston
Dr. Juan R. Paso
Dr. Jose Perohcini
Dr. Guido Pollitzer
Dr. Juan Carlos Rey

Cordoba
Dr. Hector Becerra
Dr. Agustin Caeiro
Dr. Alberto Chattas
Dr. Tomas de Villafane Lastra
Dr. Leonardo L. Dobric
Dr. Juan Martin Allende
Dr. Carlos Ferrer Moratel
Dr. Isaac F. Wolaj

Cuba

Havana
Dr. Reinaldo Gomez Ortega

Mexico

Mexico City
Dr. Pedro Alegria Garza
Dr. Julian Gonzalez Mondez
Dr. Mario Martinez Carrouche
Dr. Hector Martinez de Alva
Dr. Ricardo Tapic Acuna

Hermosillo (Sonora)
Dr. Gaston S. Madrid

Torreon (Coah.)
Dr. Jorge Coghlan
Dr. Trinidad Sanchez y Sanchez

Peru

Lima
Dr. Dagoberto E. Gonzalez

Republic of Panama

Panama City
Dr. Jose Maria Nunez

Uruguay

Montevideo
Dr. Pablo Purriel

Dr. J. Winthrop Peabody, F.C.C.P., Washington, D. C., President of the College, spent May 7 and 8 at Chicago, consulting with the Executive Secretary concerning the College program and activities. Dr. Paul H. Holinger, F.C.C.P., Chicago, Secretary-Treasurer of the College, participated in the conference.

Dr. Edwin P. Kolb, F.C.C.P., Major, MC, was re-elected Secretary of the Suffolk County (Long Island), New York, Medical Society for the seventeenth consecutive year.

Dr. Thomas J. Kinsella, F.C.C.P., Minneapolis, was elected President of the Hennepin County Medical Society at the meeting, held May 3, 1943.

Dr. Bertus C. Ball, F.C.C.P., Fort Worth, was elected Vice President of the Texas State Medical Society at the annual meeting held at Ft. Worth.

Dr. David W. Heusinkveld, F.C.C.P., a member of the Committee on Industrial Health of the Ohio State Medical Association, discussed absenteeism and other phases of industrial health in a recent broadcast over station WKRC.

Dr. Jay Arthur Myers, F.C.C.P., Minneapolis, President-elect of the College, was the guest speaker at the Black Hawk County (Iowa) Medical Society meeting, June 2, Waterloo. He discussed, "Modern Methods in Tuberculosis Control."

Dr. John H. Skavlem, F.C.C.P., Cincinnati, Ohio, was one of the speakers at the meeting of the Academy of Medicine of Cincinnati on May 18. Dr. Skavlem spoke on "Cystic Disease of the Lung."

Dr. Dan L. Mahoney, F.C.C.P., Tucson, Arizona, was chosen President-elect of the Arizona State Medical Association, at their annual meeting, April 30.

Dr. C. C. Aven, F.C.C.P., Atlanta, and Dr. Robert C. Major presented a paper on "Spontaneous Pneumothorax" before the Fulton County Medical Society on May 6. Discussions were led by Dr. Joseph C Massee, F.C.C.P., and Dr. Champ Holmes, F.C.C.P.

Dr. Louis H. Clerf, F.C.C.P., Philadelphia, Pennsylvania, was one of the guest speakers at the 8th Annual Postgraduate Institute of the Philadelphia County Medical Society on the "Management of Emergencies." Dr. Clerf spoke on "Foreign Bodies in the Bronchial Air Passages."

OBITUARIES

FLOYD NAPOLEON MOORE

1898-1943

Dr. Floyd Napoleon Moore was born in Erath County, Texas, March 15, 1898, the son of Mr. and Mrs. S. A. Moore. Dr. Moore obtained his early education at Denton, later entering the University of Texas where he received his pre-medical training. He entered Baylor Medical College, Dallas, and graduated from the school in 1928. He then entered on a medical career, specializing in diseases of the chest, that made him one of the best known and best liked physicians in the State of Texas. He died at Austin, Texas, February 25, 1943, of coronary thrombosis.

Dr. Moore became a member of the medical staff of the Texas State Tuberculosis Sanatorium on May 31, 1928. He resigned December 17, 1929, to become associated with the U. S. Veterans Administration. He later joined for a short time the medical staff of the Oklahoma State Sanatorium at Clinton. In May 1930, he rejoined the medical staff of the Texas State Tuberculosis Sanatorium where he served as a resident physician until September 1, 1933, resigning to enter private practice at Austin, Texas, where he remained until his death.

Dr. Moore was largely responsible for the establishment of the Travis County Tuberculosis Hospital at Austin, Texas, and he later became medical director for that institution. He was a member of the Austin Junior Chamber of Commerce, the Baptist Church and the Masonic Lodge. Dr. Moore had been a Fellow of the American College of Chest Physicians since 1937.

Dr. Moore was married July 14, 1923, to Miss Melitta Rauch at Dallas. In addition to the widow, he is survived by his parents, four sisters, Mrs. Hettie Salisbury, Edinburg, Texas; Mrs. Alma Higsby, Houston; Mrs. Beatrice Schumann, San Antonio; Mrs. Vada Reagan, Comanche; and three brothers, S. J. of Dripping Springs; S. E. and Raymond, both of Comanche.

J. B. McKnight, M.D.
Sanatorium, Texas

SMITH J. MANN

(1882-1943)

Dr. Smith J. Mann was born in Neodesha, Kansas, October 13, 1882. At an early age the family moved to Oregon, where he received his primary college education at Oregon Agricultural College. He graduated as Doctor of Medicine at Williamette University, now consolidated with the University of Oregon, in 1907. His internship was pursued at the Salem (Oregon) General Hospital, following which he engaged in private practice at various locations in the State of Oregon until 1917.

During World War I he was called into active military service as a First Lieutenant, Medical Reserve Corps, his first assignment being at Fort Douglas, Utah. He was discharged from the Army as a Captain in February, 1920, following which he was commissioned as Past Assistant Sur-

geon (R), U. S. Public Health Service, and ordered to active duty. Dr. Mann served at the tuberculosis institutions of the U. S. Public Health Service at Fort Stanton, New Mexico; Tucson, Arizona, and Ft. Bayard, New Mexico, specializing in diseases of the chest. In 1925 he was transferred to the Veterans Administration (then the Veterans Bureau) by presidential executive order, along with a number of other Reserve Officers of the U. S. Public Health Service who were actively engaged in hospitals for the care of veteran beneficiaries. Subsequently, Dr. Mann served as Clinical Director, Veterans Hospital, Ft. Bayard, New Mexico, being transferred to the Veterans Hospital, Albuquerque, New Mexico, as Chief Medical Officer on June 16, 1932, remaining in this capacity until promoted to Medical Supervisor, Medical and Hospital Service, Veterans Administration, Washington, D. C., November 16, 1934. On July 1, 1937, Dr. Mann was made Chief, Tuberculosis Division, Medical and Hospital Service, Veterans Administration, being directly responsible for the coordination of the functions and operation of twelve tuberculosis hospitals, with a combined capacity of over 5,000 beds. Because of his health, on his request for less arduous duties, he was transferred to the Veterans Administration Facility, Livermore, California, July 1, 1940, as Manager, which position he occupied at the time of his sudden death from coronary heart disease on April 27, 1943.

In his death the Veterans Administration has lost one of its most able clinicians in tuberculosis; an administrator of excellent judgment, and a gentleman of splendid personality who was always extremely popular with his associates.

Dr. Roy A. Wolford, F.C.C.P.
Governor, Veterans Administration

BOOK REVIEW

Clinical Significance of the Blood in Tuberculosis. Muller, Gulli Lindh, M.D. 516 Pages, 19 Tables and Charts, No Illustrations. First Edition, 1943. Price: $3.50. The Commonwealth Fund, New York.

This is a monograph based on 6819 complete hematological examinations on 1,000 cases consecutively admitted to the Rutland State Sanatorium, Rutland, Mass., and a review of the relevant literature.

The book is divided into six parts. In the introduction (Part I), the author summarizes the physiology of the blood forming organs, and the cellular response of the bone marrow to tuberculosis and that of the tissues to the tubercle bacillus. Part two deals with the changes in the circulating blood in tuberculosis. Dr. Muller discusses the history of the Arneth count and its modifications, and thinks that the neutrophil-lymphocyte ratio and the nuclear shift are the most significant determinations. In the chapter on the hemorrhagic diathesis no mention is made of the prothrombin time and Vitamin K therapy although Vitamin C is mentioned.

The section on the sedimentation rate presents a lucid summary of the mechanism of the phenomenon as described by others The author lists the numerous methods and evaluates their validity, making the point that the disrepute in which the sedimentation rate is widely held is due in part to the lack of standardization of the procedure and correction of factors. She has devised a correction table based on the hematocrit reading.

In the part on clinical and hematological data as measures of the constitutional reaction, the author states that the sedimentation rate is the most sensitive pathological criterion, followed in order by loss of weight, lymphopenia, shift to the left, monocytosis, neutrophilia, and leucocytosis. She found that in only a little more than one third of her cases were the clinical and hematological findings closely associated, and she claims that the hematological reaction to tuberculous disease appears to be far more delicate and seems to be present at an earlier date than demonstrable clinical signs.

The effect of therapeutic methods, exercise, and certain complications on the hematological picture is discussed, and the practical point is made that patients with a persistently high sedimentation rate and persistent increase in the neutrophilic band forms before operation do not benefit to the same extent and in the same time interval as do those in whom the disease has become localized as evidenced by the hematological reaction. She emphasizes the additional point that patients whose constitutional reaction as demonstrated hematologically, is subclinical do not react favorably to thoracoplasty. Another practical point to be kept in mind during a multiple stage thoracoplasty is that if the red cell-volume increases markedly after collapse therapy is begun this fact should serve as a danger signal, intimating that irrevocable collapse should be used cautiously. Dr. Muller likewise sounds a warning regarding the danger of instituting exercise in the presence of hematological evidence of constitutional reaction although clinical and roentgenological signs are negative.

The brief and useful section on examination of the blood is of interest to laboratory workers.

The bibliography is exhaustive, the index is complete, the typography is good, and the presentation of material although less condensed than possible, is attractive. The author is conversant with an extensive literature, and her evaluation thereof in the light of her well-controlled data makes an informative volume especially for younger workers and those not primarily trained in both hematology and phthisiology.

Sheldon Domm, M.D.

READER NOTICE

Any Physician may Exhibit "When Bobby Goes to School" to the Public.

Under the rules laid down by the American Academy of Pediatrics, their educational-to-the public film, "When Bobby Goes to School," may be exhibited to the public by any licensed physician in the United States.

All that is required is that he obtain the endorsement by any officer of his county medical society. Endorsement blanks for this purpose may be obtained on application to the distributor, Mead Johnson and Company, Evansville, Indiana.

Such endorsement, however, is not required for showings by licensed physicians to medical groups for the purpose of familiarizing them with the message of the film in advance of public showings in the community.

"When Bobby Goes to School" is a 16-mm. sound film, free from advertising, dealing with the health appraisal of the school child, and may be borrowed without charge or obligation on application to the distributor, Mead Johnson and Company, Evansville, Indiana.